Sunny Mini Central
SMC 5000A / 6000A
Inverter for three-phase grid feeding PV plants

Installation Guide | Version 2.0 | SMC50A_60A-IEN073320
IME-SMC50A_60A

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1 Notes on this Manual

1.1 Validity

This installation guide covers the correct installation and commissioning of type Sunny Mini Central SMC 5000A and SMC 6000A SMA inverters.

1.2 Target Group

Only trained electricians approved by the responsible energy supply company may install and commission the inverters. The instructions assume that you, the installer, are familiar with electrical installations and know the corresponding rules and regulations.

1.3 Explanation of the Symbols Used

This symbol indicates a fact which, if ignored, could result in damage to components or personal hazard. Please read these sections especially carefully.

This symbol indicates a fact that is important for optimum operation of the product. Read these sections carefully to ensure this.

This symbol indicates an example.

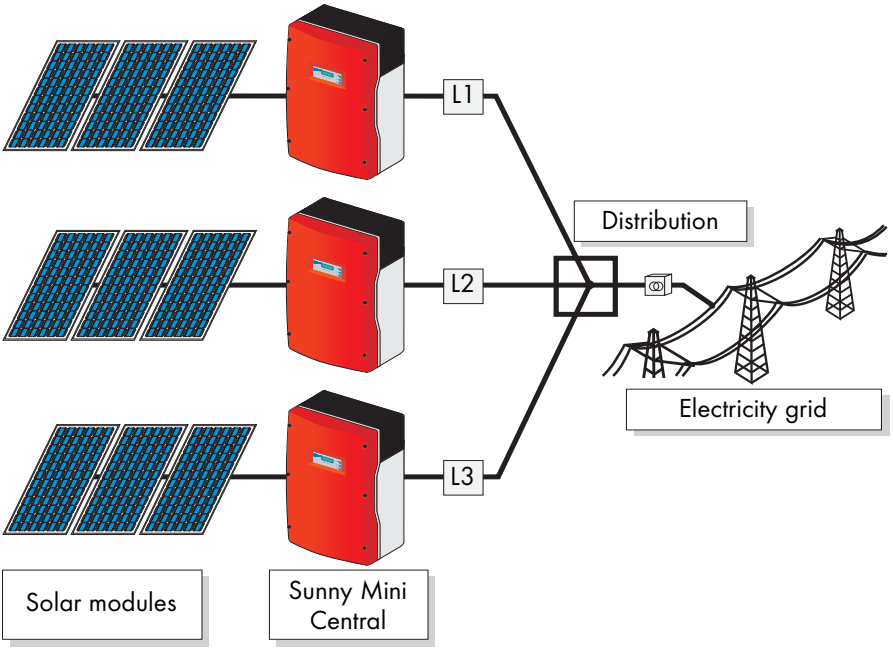
2 The Sunny Mini Central

2.1 Appropriate Usage

The Sunny Mini Central is a photovoltaic inverter and serves to feed solar energy from solar modules converted using photovoltaics into a low voltage grid with a nominal voltage of 220 to 240 V and 50 Hz or 60 Hz.

Do not use the Sunny Mini Central for purposes other than those described here. Alternative uses, modifications to the inverter as well as installing components not recommended or sold by SMA void the warranty and operating license.

Principle of a solar power system with a Sunny Mini Central SMC 5000A or SMC 6000A



3 Safety Instructions

3.1 Handling of the Sunny Mini Central

All work on and in the Sunny Mini Central must be carried out by a qualified electrician. The electrician must be approved by the local energy supplier.

Open and close the Sunny Mini Central only as described in section 10 "Opening and Closing the Sunny Mini Central" (Page 58) and follow the safety instructions listed there.

The Sunny Mini Central weighs approximately 63 kg. Two people must carry the unit or a suitable transport trolley must be used. Safety boots must be worn.

The temperature of individual parts of the housing and of components inside the Sunny Mini Central can reach more than 60 °C. Touching these parts could result in severe burns.

Once the handle of the Electronic Solar Switch has been pulled out, the Sunny Mini Central provides protection rating IP21. Thus it is no longer protected against water seepage and foreign objects.

Check the system design using the Sunny Design program (www.SMA.de) or by calling the Sunny Boy Serviceline before installing the Sunny Mini Central. Overvoltages lead to the destruction of the Sunny Mini Central, thereby voiding all warranty claims.

Avoid contact with the PV modules when they are running, as a minimal displacement current could flow and cause a secondary accident due to shock. Therefore, maintenance work may only be performed on the solar generator when it is disconnected. Disconnecting the Sunny Mini Central from the grid is not sufficient.

In addition, touchable conducting parts such as the framework of the PV generator should be grounded.

Follow the instructions in the pictograms, signs and labels on each inverter and ensure that they are legible at all times.

General safety rules for working on photovoltaic systems:

1. **Disconnecting the device**

   Before you start to work on the unit, disconnect all wires which could carry voltage to the area you are working on!

2. **Protect against reenergizing**

   To prevent the device from being reenergized ensure that you block or lock it!

3. **Test each unit to ensure that all voltages have been removed**

   Use a voltmeter to ensure that the unit is completely deenergized! Ensure that all poles of the unit are free of voltage!

3.2 Installer's Responsibilities

Each person working on an electrical device is responsible for the safety of all persons involved and for the safety of the device.

Be sure to observe all standards and regulations applicable to the installation and site.

This installation guide, the operating manual and the documentation of installed components must be kept in the immediate vicinity of the inverter and must be available to installation, operation, maintenance and service staff at all times.

The inverter should only be used when it is safe to do so. All safety features must be accessible at all times and their correct operation should be regularly tested.

Read this installation guide carefully and be sure to observe and understand all safety regulations when installing and commissioning the system. You must also observe and understand all connection requirements of the local energy supplier and all applicable national codes and standards for installation of this equipment.

The information regarding operational safety refers to the regulations of the European Union valid at the time the inverter was produced. The installer is obliged to make sure that the mentioned safety measures comply with the regulations valid at the time and to observe new regulations when installing the inverter. Outside the European Union, the laws on occupational safety applicable in the deployment location of the device and the respective national requirements must be adhered to.

In addition to the work safety measures in this installation guide, the general safety and accident prevention regulations which apply where the inverter is installed and the valid environmental protection regulations must be observed and followed.

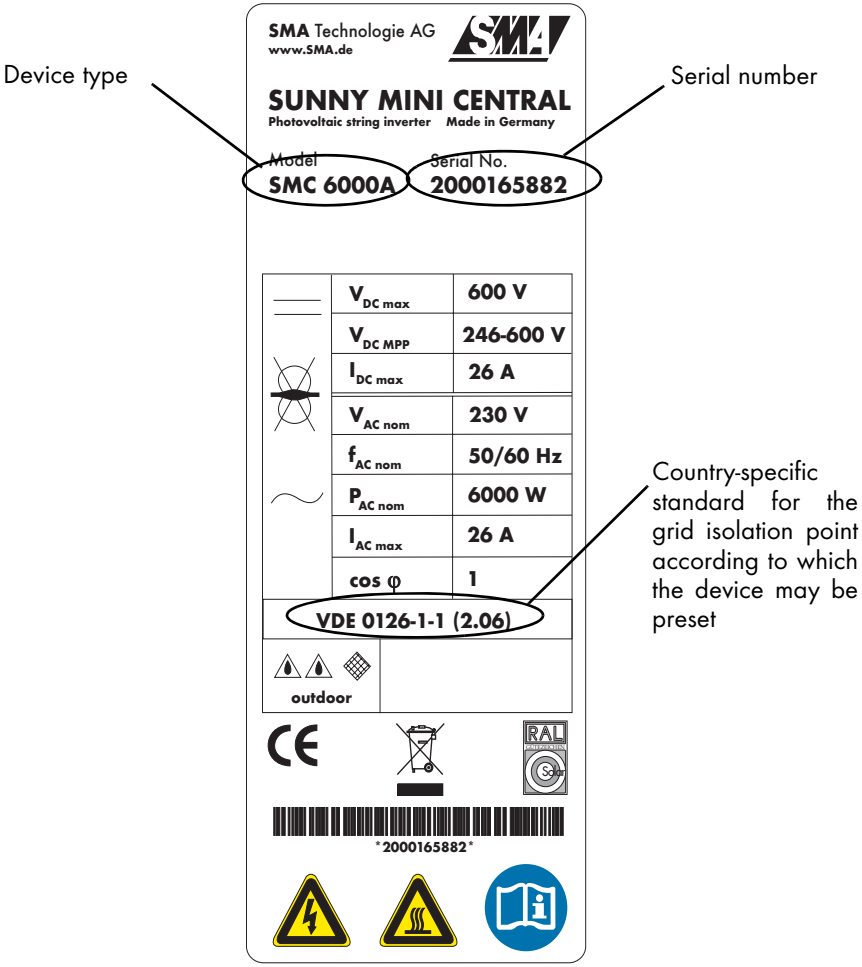
Follow all instructions in this installation guide completely and without restrictions!

4 Overview of the Device

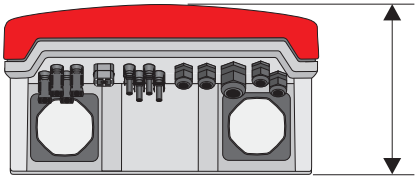
4.1 Identification

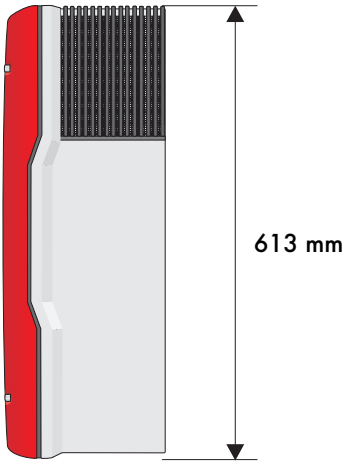
You can identify the Sunny Mini Central with the aid of the name plate (see figure below). The name plate is found on the right-hand side of the housing (when viewed from the front). It contains information regarding the device type, serial number, device-specific key data, the CE mark and SMA contact information.

The following is an example of a Sunny Mini Central SMC 6000A name plate:

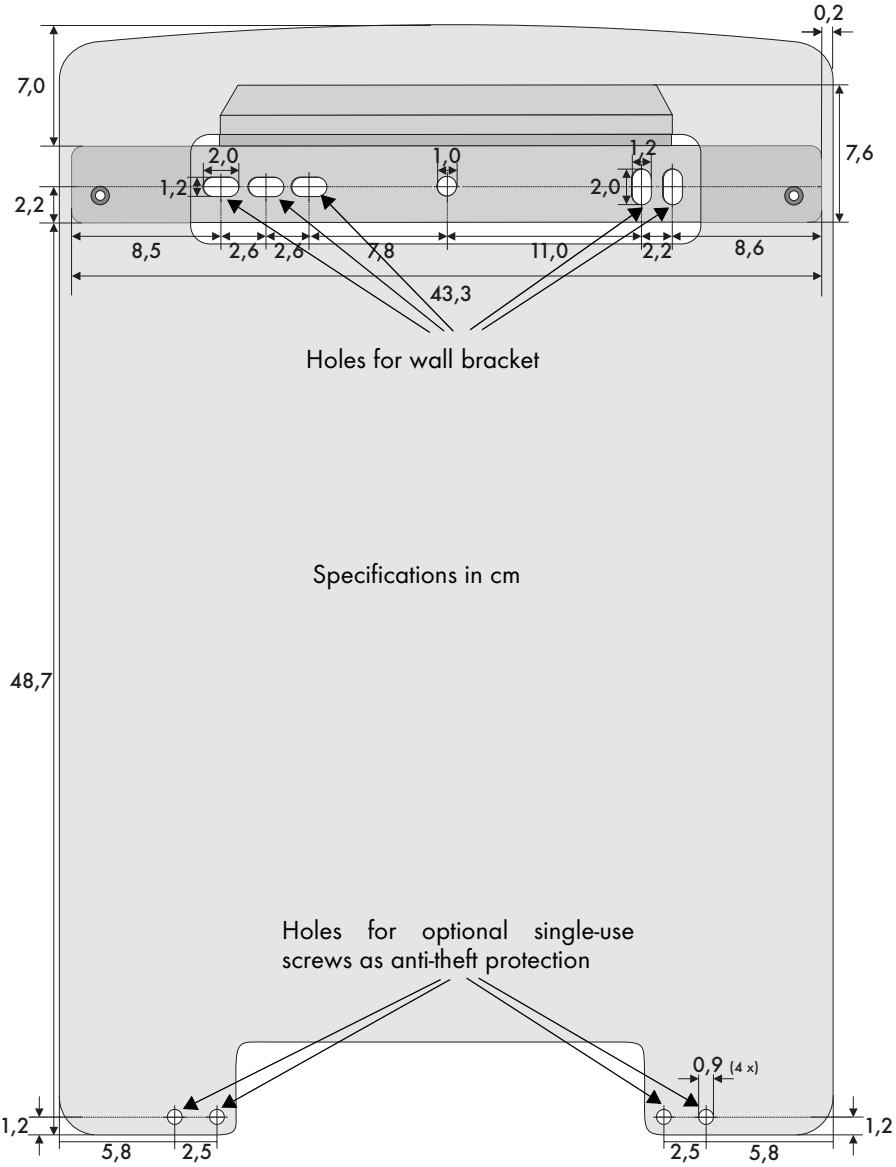


4.2 Dimensions





Wall bracket and rear panel



4.3 Electronic Solar Switch (ESS)

The Sunny Mini Central is equipped with the integrated electronic DC load-disconnecting switch ESS. This reliably prevents the arcing that usually occurs when disconnecting the inverter from the PV generator, which can cause personal injury and may damage the inverter connections. To access the DC input plugs in order to safely disconnect the PV generator from the inverter, you only need to pull on a grip handle on the base of the inverter.

Disconnecting the inverter thus becomes a three-step process:

1. Disconnecting the AC side
2. Pulling off the Electronic Solar Switch handle
3. Disconnecting the DC plug connectors

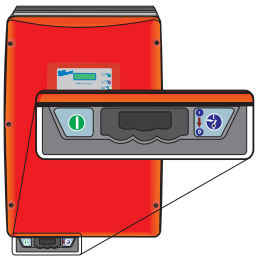
WARNING!

Safe disconnection from the PV generator is only guaranteed after removal of the Electronic Solar Switch, and of all DC plug connectors.

Assembly

The Electronic Solar Switch consists of a handle on the underside of the inverter, and an assembly inside the inverter.

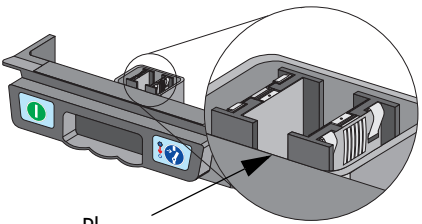
A handle is mounted on the underside of the inverter which covers the PV generator's connectors.



Electronic Solar Switch handle

A plug is inside the handle. The Electronic Solar Switch's connector is only visible once the handle has been pulled.

The connector is fitted in the handle as a floating connector, so that the handle does not catch when being pulled from the inverter.

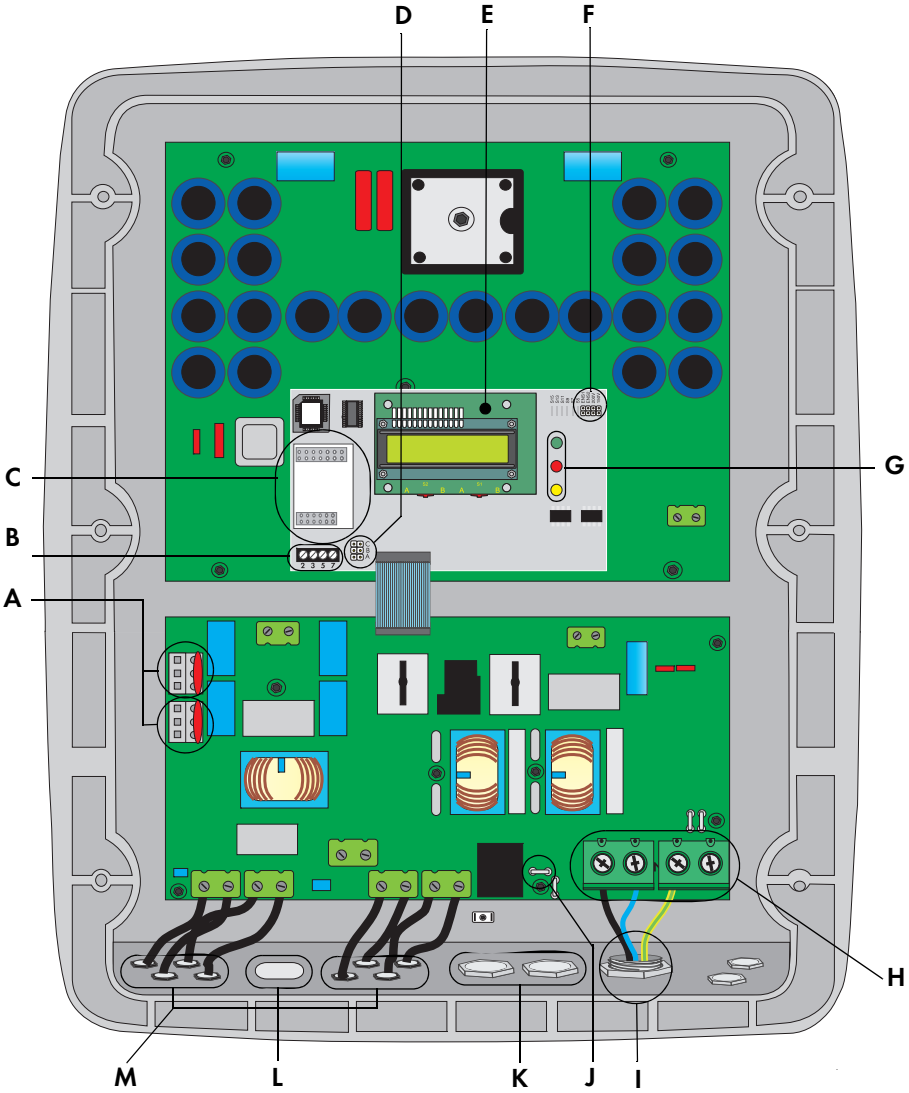


Plug

Do not tighten the connector's screws. Otherwise, safe disconnection cannot be guaranteed.

4.4 Interior View

The following diagram gives a schematic overview of the various components and connection points inside the Sunny Mini Central SMC 5000A and SMC 6000A with the cover removed:



A Varistors (Page 65)

B Connection terminals for communication (Page 48)

C Socket for communication Piggy-Back (RS232, RS485, radio) (Page 48)

D Jumper for communication (Page 48)

E Sunny Display (Page 54)

F Jumper for fan testing (Page 69)

G Operating status LEDs (Page 55)

H Connection terminals for mains cable (AC) (Page 41)

I Cable duct for mains cable (AC) (Page 41)

J Flat connection for grounding the cable shield for RS232 and RS485 communication (Page 48)

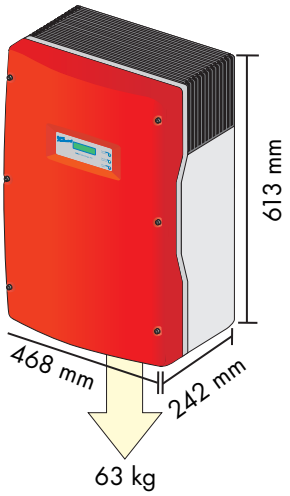
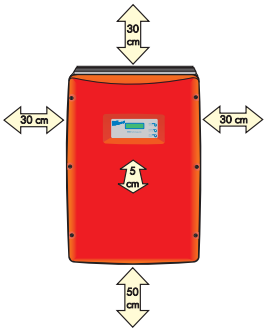
K Cable feed-throughs for communication (Page 48)

L Connection plug for ESS (Page 15)

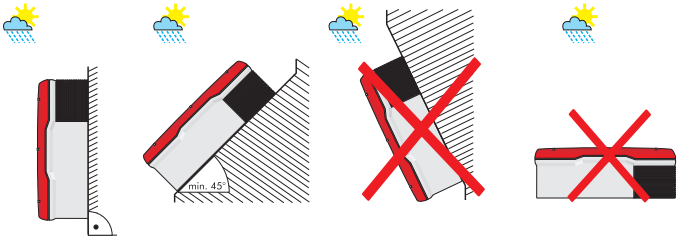
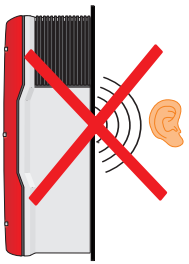
M PV input plug (DC) (Page 28)

5 Installation

5.1 Selecting an Installation Location

<table>
<tr><th>No.</th><th>Checkpoint</th><th>Control</th></tr>
<tr><td colspan="3">Location</td></tr>
<tr><td>1</td><td>The installation location and method of installation is suitable for the weight of approximately 63 kg and the dimensions of 468 mm x 613 mm x 242 mm (width x height x depth) of the Sunny Mini Central.
 
</td><td></td></tr>
<tr><td>2</td><td>The following minimum clearances to walls, other devices or objects must be observed to guarantee sufficient heat dissipation.
<table>
<tr><th>Direction</th><th>Minimum clearance</th></tr>
<tr><td>Sides</td><td>30 cm</td></tr>
<tr><td>Top</td><td>30 cm</td></tr>
<tr><td>Underside</td><td>50 cm</td></tr>
<tr><td>Front</td><td>5 cm</td></tr>
</table>

</td><td></td></tr>
</table>

No.	Checkpoint	Control
3	If several Sunny Mini Central units are installed in areas where high ambient temperatures are to be expected, the individual Sunny Mini Central units must be far enough apart to ensure that the individual Sunny Mini Central units do not intake the cooling air of the neighboring unit. If necessary, increase the clearances and ensure that the device is sufficiently ventilated!	
4	The Sunny Mini Central is accessible at any time (e.g. not mounted on roofs that are difficult to access).	
5	The Sunny Mini Central can be removed from the installation location easily (by two people), in spite of its weight of 63 kg.	
6	**The Sunny Mini Central is not installed in areas where highly flammable materials are stored or in potentially explosive areas.**	
7	The Sunny Mini Central is not exposed to direct sunlight, in order to avoid yield losses of the PV system.	
8	The ambient temperature is always between -25 °C and +60 °C.	
9	**The Sunny Mini Central must be mounted such that the inverter cannot be touched inadvertently!** **The temperature of individual parts of the housing and of components inside the Sunny Mini Central can reach more than 60 °C. Touching these parts could result in severe burns.**	
10	**The Sunny Mini Central is installed in such a way that it is not possible (e.g. for children) to unintentionally unplug the DC plug connector. Unintentionally pulling out the DC plug connectors under load can damage the plugs and could result in personal injury!**	

No.	Checkpoint	Control
Position		
11	The Sunny Mini Central is mounted vertically on a wall, or if it is absolutely necessary, tilted back to an angle of max. 45°. 	
12	The Sunny Mini Central is installed so that it is **not** slanting forward.	
13	The Sunny Mini Central is **not** installed horizontally.	
14	The Sunny Mini Central should ideally be installed at eye level to allow operating conditions to be read at all times.	
Foundation		
15	The Sunny Mini Central is mounted on a solid surface.	
16	**The Sunny Mini Central is not mounted on flammable construction materials.**	
17	In a living area, the Sunny Mini Central should not be mounted on plasterboard walls or alike as otherwise audible vibrations are likely to result. The Sunny Mini Central makes noises when in use, which can be a disturbance in a living area. 	

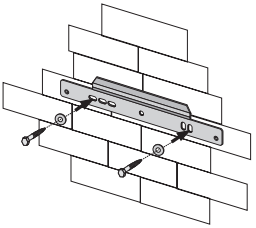
5.2 Required Tools and Materials

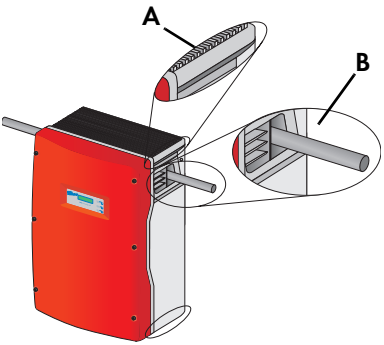
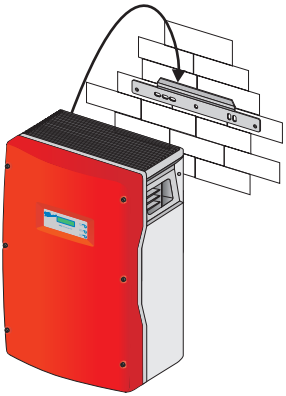
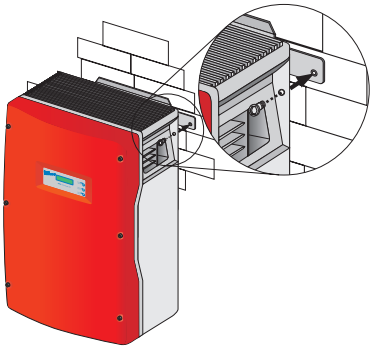
Number	Tool/material	Purpose
1	drill with a suitable drill bit	drilling the holes for the wall bracket
2 - 4	wall anchors with a diameter of 10 mm (for attachment to a concrete or stone wall, for example)	insertion in the holes in the wall for the wall bracket
2 - 4	8 mm x 60 mm hexagon bolts to DIN 571 standard, stainless steel type (for attachment to a concrete or stone wall, for example)	attaching the wall bracket to the wall
1	appropriate spanner	attaching the wall bracket to the wall
1	hexagon (allen) key (5 mm)	attaching the Sunny Mini Central to the wall bracket
1	steel bar with max. diameter of 30 mm	poss. for carrying the Sunny Mini Central (slide through the rear housing opening)
Optional for anti-theft protection:		
2 - 4	wall anchors with a diameter of 10 mm (for attachment to a concrete or stone wall, for example)	insert in the holes in the wall for the anti-theft screws (if desired)
2 - 4	corresponding single-use screw systems (8 mm)	anti-theft protection of the Sunny Mini Central (if required)
1	suitable screwdriver	securing the single-use screws for anti-theft protection (if desired)

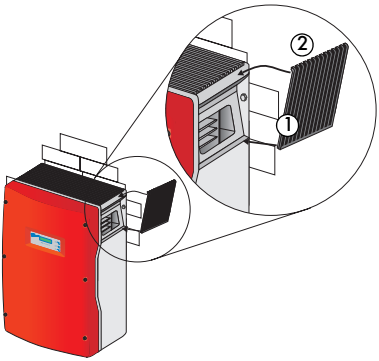
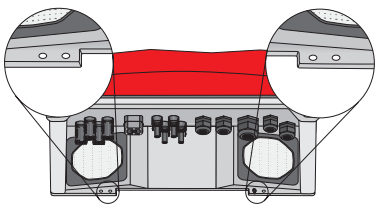
5.3 Mounting the Sunny Mini Central

Only use the provided wall bracket for installation!

When mounting the device, be sure to take into account the weight of the Sunny Mini Central of 63 kg!

Step	Instruction	
Mounting the Wall Bracket		
1	For mounting the wall bracket, use two to four of the six holes in the middle.	
2	Mark the positions of the drill holes by using the wall bracket as a drilling template (see Page 14 for a sample).	
3	Drill the holes, insert the wall anchors and secure the wall bracket with screws using corresponding washers. 	
	Recommended bolts:	8 mm x 60 mm hexagon bolts to DIN 571 standard, stainless steel type
	Recommended wall anchors:	SX10

Step	Instruction
Mounting the Sunny Mini Central	
4	When transporting and installing the Sunny Mini Central, use the ergonomic handles at the top and bottom at the sides of the Sunny Mini Central (A), or the housing opening, for example by inserting a steel bar (B) (diameter max. 30 mm). 
5	Hang the Sunny Mini Central using the mounting holes on the rear face into the wall bracket. Take care to ensure that the Sunny Mini Central locks audibly into place in the wall bracket. 
6	Fix the Sunny Mini Central to the wall bracket using the two enclosed M6 x 8 mm bolts on both sides of the Sunny Mini Central. Fasten the bolts so that they are hand-tight! 
7	Make sure that the Sunny Mini Central is positioned securely on the bracket.

Step	Instruction
8	Close the recessed grips with the handle covers provided in the accessories kit. They are required to adequately prevent insects entering the unit! If required, new handle covers can be ordered from SMA (contact: see Page 92). 
Optional Anti-theft Protection	
9	To protect the Sunny Mini Central against theft, the rear face can be secured to the wall at the bottom using 2 so-called single-use bolts. The other two holes are spare, in case you take down the Sunny Mini Central and then mount it again, and the screw stumps from the first single-use bolts still protrude from the wall.  The exact position of the holes can be seen in the illustration of the rear panel in section 4.2 "Dimensions" (Page 13).

6 Electrical Connection

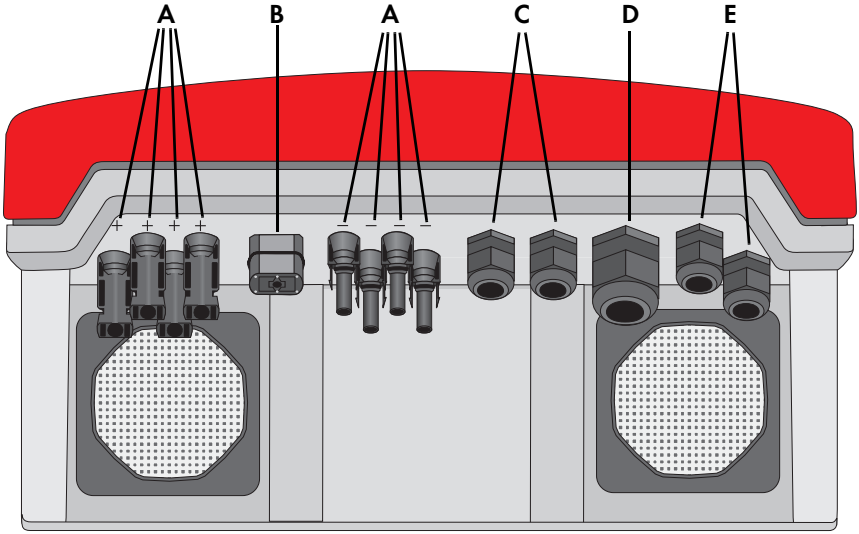
6.1 Required Tools and Materials

Number	Tool/material	Purpose
2-8	PV plug connectors	for the connecting cables of the solar modules for connection to the Sunny Mini Central
1	multimeter with DC input voltage range up to at least 600 V	checking the connecting wires of the solar modules for correct polarity and ensuring that the maximum input voltage of the Sunny Mini Central is not exceeded
1	hexagon (allen) key (5 mm)	opening and closing the housing cover and securing the additional grounding terminal to the housing, if required
1	cable with external diameter between 11 and 25 mm	AC connecting cable
1	stripping pliers	stripping the AC cable
1	flathead screwdriver, 1 x 6 mm or Phillips screwdriver PZ2 Pozidrive	using the screw clamps for the AC connection
1	terminal clamp (provided in accessories kit)	additional grounding of the housing (if necessary)
1	hexagon socket screw (M6x16, provided in accessories kit)	additional grounding of the housing (if necessary)
1	washer (M6, provided in accessories kit)	additional grounding of the housing (if necessary)
1	grounding cable with a cross-section between 4 and 10 mm²	additional grounding of the housing (if necessary)
1	line circuit breaker (see Page 44 for rating)	power circuit fuse

6.2 Connection Procedure

When connecting the unit to the power supply, do not deviate from the sequence described here!

The following figure shows the assignment of the individual housing ducts on the base of the Sunny Mini Central.



A Plug connectors for connecting the PV strings

B Plug connector for connecting the ESS (Electronic Solar Switch)

C Cable feed-throughs for optional communication via RS232, RS485 or radio (PG16)

D Cable feed-through for grid connection (AC) (11 mm - 25 mm)

E is not used

6.3 Connection of the DC Input

6.3.1 Requirements

For connecting the DC input, the following requirements must be satisfied:

1. The connected strings must consist of modules of the same type and number and should have an identical orientation and tilt.
2. The connecting wires of the solar modules must be equipped with plug connectors to allow the eight DC plug connectors of the Sunny Mini Central to be connected to it.

   A pre-assembled set for connecting the free cable ends from a string is available as an optional accessory from SMA:

Connection set	Order code	Maximum flow current
Multi-Contact 3 mm	SWR-MC	21.0 A
Multi-Contact 4 mm	MC-SET	30.0 A
Tyco	TYCO-SET	30.0 A

3. Make sure that the following limit values at the DC input of the Sunny Mini Central are not exceeded:

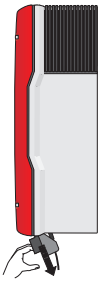
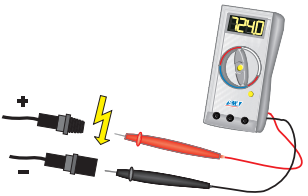
Device	Maximum input voltage	Maximum input current
SMC 5000A	600 V (DC)	26.0 A (DC)
SMC 6000A	600 V (DC)	26.0 A (DC)

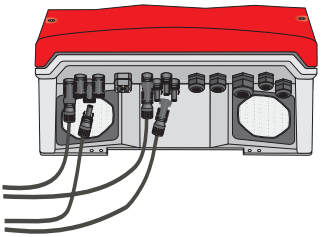
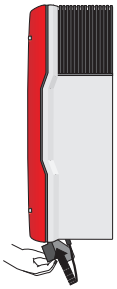
4. Check the system design and the string size using the design program Sunny Design which is available to download free at www.SMA.de.

6.3.2 Connection of PV Strings

NOTICE! The AC side of the Sunny Mini Central must be disconnected from the grid before you connect the PV strings to the Sunny Mini Central!

To connect up the PV strings, follow these steps:

Step	Instruction
1	Remove the Electronic Solar Switch on the underside of the Sunny Mini Central. 
2	Make sure the connecting cables of the solar modules have the right polarity and do not exceed the maximum input voltage of the Sunny Mini Central (see section 6.3.1 "Requirements" (Page 27)). 
	WARNING! Dangerously high voltages may be present. Danger of death! Make sure that you only use measuring devices with a DC input voltage range up to at least 600 V!
3	Taking one DC plug connector at a time, measure the direct current voltage between one DC plug connector of a string and ground potential. If the measured voltages are constant and their total is roughly the same as the open circuit voltage of the string, then there is a ground fault in this string. Its approximate location can be deduced from the relationships between the voltages.
4	**WARNING! Do not connect strings to the Sunny Mini Central that contain a ground fault until you have fixed the ground fault in these strings!**
5	Repeat step 2 for each string.

Step	Instruction
6	Connect up the faultless PV generator strings as indicated on the right. 
7	Close the unused DC input sockets with the caps included in the delivery.
8	Reinsert the handle of the Electronic Solar Switch in the socket on the underside of the Sunny Mini Central. 
	The Electronic Solar Switch can be damaged if it has not been attached properly. The handle must be firmly attached to the Electronic Solar Switch's socket, and rest against the housing. Check that the handle is positioned correctly before recommissioning the inverter.

6.3.3 Reverse Current

Advice on Generator Configuration for PV Systems Using the Sunny Mini Central

In contrast to the Sunny Boy string inverters, three and more strings are usually connected in parallel in the PV generator of a system using the Sunny Mini Central. This does not sound particularly spectacular but it has practical consequences because, in such large generators, certain faults which are totally uncritical in string systems must be allowed for. Short circuits can cause wrongly directed module current, leading to a solar module being subjected to so-called reverse current, which may be considerably higher than the normal maximum current (short circuit) of the solar module.

How Does Reverse Current Occur?

In principle, reverse current can only occur when modules are connected in parallel and the open circuit terminal voltage (open circuit voltage UPV 0) of the individual parallel strings is different. In normal operation, this is avoided adequately when the strings are of the same length. Since shadowing of the modules has no significant effect on UPV 0, even in this situation no significant reverse current occurs.

In failure-free operation of a correctly dimensioned PV generator, no excessive reverse current can occur!

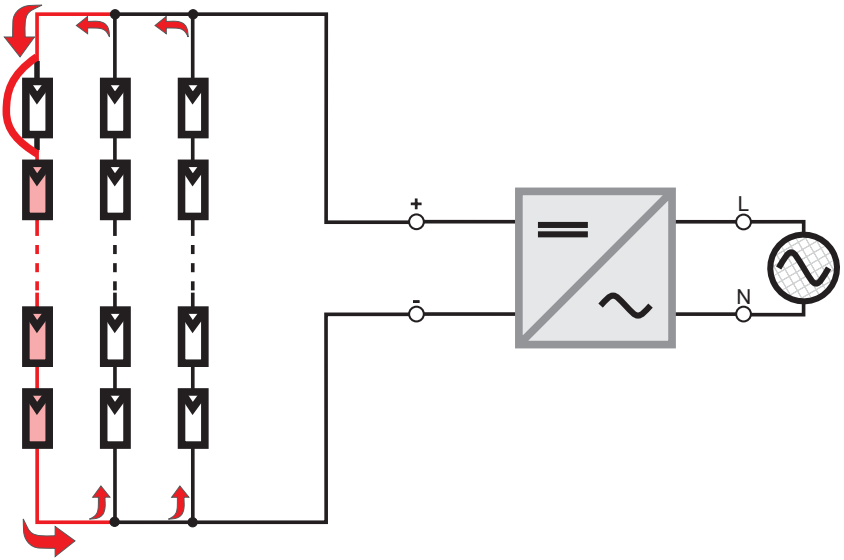
Reverse current can only occur due to a fault in the solar generator (e.g. short circuit in one or more modules) that causes the open circuit terminal voltage of a module string to be significantly lower than the open circuit terminal voltage of other parallel strings. In the worst case, the voltage on the faulty string may lie within the MPP voltage (UMPP) of the remaining generator elements. The internal diode structure of the solar cells causes reverse current to flow through the faulty generator string that, depending on the amount of current, may lead to excessive heating or destruction of the modules in this string.

Among other symptoms, the following faults may lead to reduction of the open circuit terminal voltage of a generator string and subsequent reverse current in parallel-connected systems:

- Short circuit in one or more modules
- Short circuit in one or more cells in a module
- Double ground fault in a module and/or the cabling

Despite the fact that these faults are very unlikely, and extremely rare in practice, preventative measures must still be taken. After all, these types of faults carry a high potential for damage and danger, since all modules in the affected string may be damaged and the local heating may also cause secondary damage.

Reverse current into the faulty string = Total current of the remaining strings



How Can Reverse Current in the Modules be Prevented?

First we must explain that bypass diodes which are the current state-of-the-art in module construction do not influence the reverse current in the module, but only reduce the effect of any shadowing which may occur.

In order to prevent or to limit the reverse current into the modules, the following standard methods can be applied:

1. String technology

All components in a string (modules, cable cross-section, plug connectors) must be designed as reverse current for the remaining generator short-circuit current. In case of parallel connection of maximum two strings, this is always the case, since the resulting reverse current of a (defect) string can reach no higher value than the value of the short circuit current of the (intact) string.

2. String diodes

The so-called string diodes connected in series with the individual strings prevent any reverse current in the corresponding string. Disadvantage: The diode is always connected in series to the corresponding generator string, the string current flows through it and leads to correspondingly high continuous losses. Moreover, the failure of the diode may cause the loss of the safety function or lead to the failure of the entire string.

3. String fuses

String fuses connected in series to the individual strings can limit the reverse current in the corresponding string to the permitted maximum. The losses at the string fuses are significantly lower than in string diodes. Failure of a string fuse can be detected by monitoring the fuse or by intelligent fault monitoring of the solar generator.

Only the first option is viable for low-cost systems.

Design Notes

Check the following points below:

Step	Test
1	Do all the strings have the same number of series-connected modules?
2	How high is the maximum reverse current in a defective string at nominal conditions? Example: generator with 4 strings of modules at 5 A short-circuit current The maximum reverse current is 3 x 5 A = 15 A.
3	Are the modules suitable for such a reverse current?
4	If not: Have appropriate measures been taken in order to avoid these currents (e.g. string fuse in each string)?
5	Are the plug connectors of the modules and the inverter suitable for such a reverse current?
6	Is the string wiring suitable for such a reverse current?

6.4 Connecting the AC Output

6.4.1 Requirements

For connecting the AC output, the following requirements must be satisfied:

1. **Connection Requirements**

   When connecting an inverter to the public grid, follow the connection requirements of the local grid operator!

   The Sunny Mini Central is designed for operation on 220 V - 240 V grids. Additionally, it is equipped with an automatic grid frequency identifier and can thus be connected to a 50 or 60 Hz system without further parameterization.

   The following limit values for the AC output apply:

	Limit values for AC output
Voltage range (default setting per DIN VDE 0126-1-1)	198 V - 253 / 260 V[a)]
Voltage range (adjustable operating range)	180 V - 265 V
Frequency range (default setting per DIN VDE 0126-1-1)	47.5 Hz - 50.2 Hz
Frequency range (adjustable operating range)	50 Hz: 45.5 Hz - 54.5 Hz 60 Hz: 55.5 Hz - 64.5 Hz

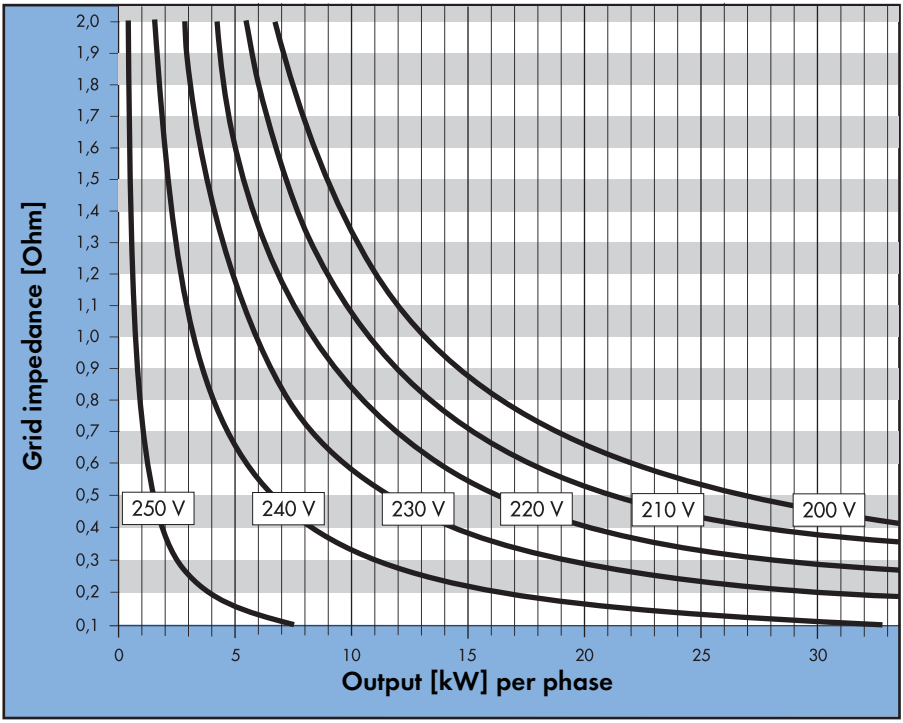
a) The Sunny Mini Central can temporarily feed power into the grid with a maximum output voltage of 260 V. However, DIN VDE 0126-1-1 stipulates that the average voltage over 10 minutes must not exceed 253 V. That means for example, if the grid voltage is constantly 254 V, the inverter disconnects itself from the grid. In this case, contact the local grid operator for assistance.

   DIN VDE 0126-1-1 only applies in Germany. See section 14.4.3 "Country-specific Parameter Settings" (Page 89) for all other preset country values of your inverter.

2. Grid Impedance

Due to a high grid impedance, a high line resistance or a high voltage at the feed-in point, a high AC voltage may result at the connection point of the Sunny Mini Central. In Germany, the 10-minute average of the output voltage (Uac) of the Sunny Mini Central is limited to 253 V according to DIN VDE 0126-1-1. If the Sunny Mini Central records that the 10-minute average exceeds this voltage limit, or if the 260 V limit is exceeded, it switches off immediately and displays a grid error message. If voltage rise protection is not required in the relevant grid area (outside Germany), it is deactivated by means of presetting the LDVtgC parameter (see section 14.4 "Sunny Mini Central Operating Parameters" (Page 82)). In this event, only the fast cut-off via the Uac-Max parameter intervenes.

The following diagram shows the power output the inverter can feed into the grid per phase without leading to a switch-off because the AC voltage is too high.



The following variables are needed to make an estimate:

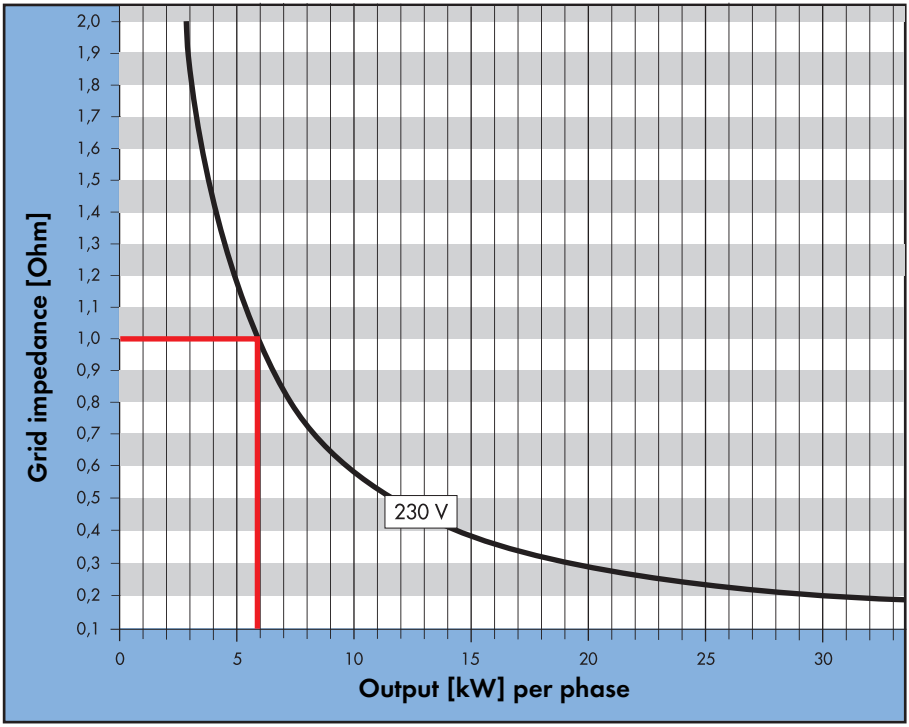
- Grid voltage without mains supply
- Grid impedance at the terminal of the Sunny Mini Central

The diagram shows the respective curves for a grid voltage without mains supply. A maximum possible feed-in power per phase (X axis) is obtained for the respective curves depending on the grid impedance (Y axis).

With three-phase connection and symmetrical feeding, the maximum possible feed-in power per phase is approximately doubled.

Example:

- The grid voltage without mains supply is 230 V
- The grid impedance at the terminal is 1.0 Ohms

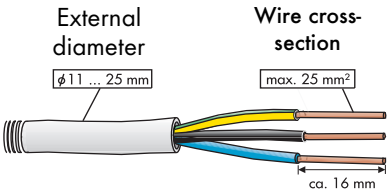


The power read on the X axis is approximately 5.8 kW per phase.

Consequently, only one Sunny Mini Central may be installed per phase in this example. A higher output per phase, without causing a disconnection because of AC overvoltage, requires better connection conditions for the Sunny Mini Central (e.g. a cable with a larger cross-section).

3. Cable Connection

The connection terminals in the Sunny Mini Central are suitable for wire cross-sections of up to 25 mm².



The external diameter of the cable must therefore be between 11 mm and 25 mm. If you use a cable with a cross-section smaller than 14 mm (11 mm minimum), the rubber bushing in the screw fitting must be replaced by the one included with the inverter at delivery.

Strip approximately 16 mm of the insulation from the conductors of the cable. The connection is made with three wires (L, N, PE).

4. Additional Grounding of the Housing

As well as the main protective earth connection at the AC terminal, the Sunny Mini Central is also equipped with an additional protective earth connection directly on the housing. This can be used if a second protective earth connection is required by the energy supply company.

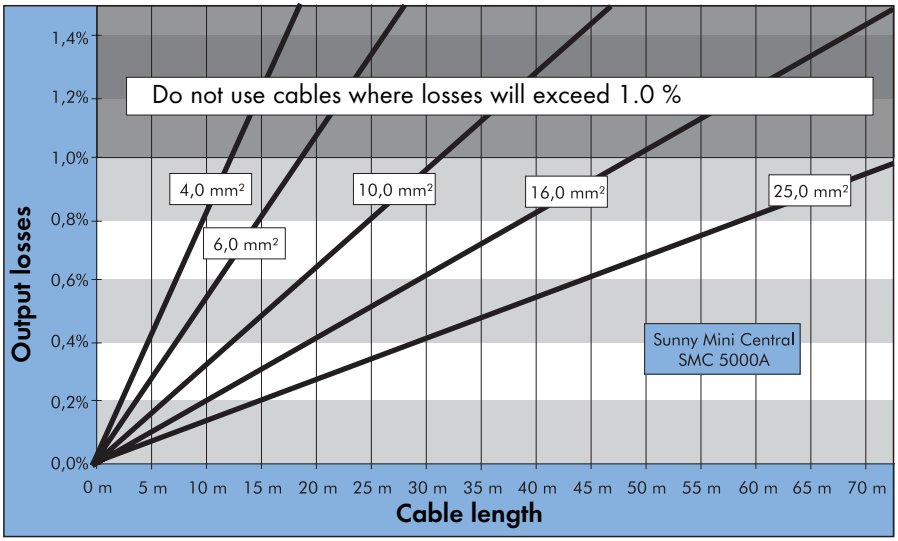
5. Wire Design

Do not use cables where the losses will exceed 1.0 %!

For optimum operation of the inverter, the grid impedance of the AC cable must not exceed 1 Ohm. This is necessary, amongst other things, for the correct operation of the impedance monitoring. The cable cross-section should be dimensioned so output losses do not exceed 1 % at the nominal power. Output losses depending on the cable length and cross-section are shown in the graphs below. Multi-wire cables with copper forward and return conductors are used.

Use the following diagrams to check your wire design:

Output losses of the Sunny Mini Central SMC 5000A

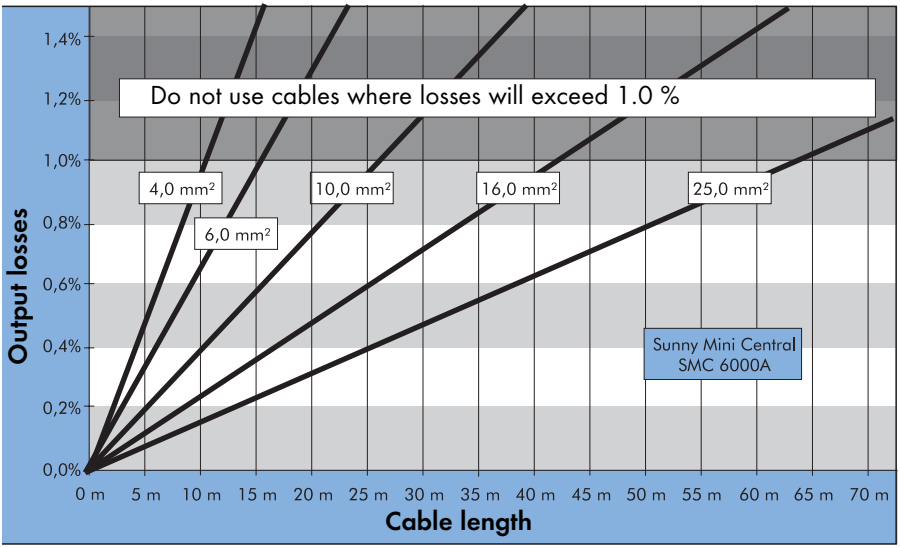


The following maximum cable lengths are possible for the different cable cross-sections:

Cable cross-section	4.0 mm²	6.0 mm²	10.0 mm²	16.0 mm²	25.0 mm²
Max. cable length	12.4 m	18.6 m	31.1 m	49.7 m	77.7 m

With three-phase connection and symmetrical feeding, there is no load on the neutral conductor, and the line losses are halved. Thus, the maximum possible cable length is doubled.

Output losses of the Sunny Mini Central SMC 6000A



The following maximum cable lengths are possible for the different cable cross-sections:

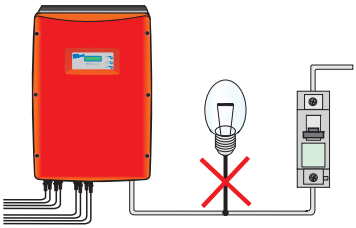
Cable cross-section	4.0 mm²	6.0 mm²	10.0 mm²	16.0 mm²	25.0 mm²
Max. cable length	10.3 m	15.5 m	25.9 m	41.4 m	64.8 m

With three-phase connection and symmetrical feeding, there is no load on the neutral conductor, and the line losses are halved. Thus, the maximum possible cable length is doubled.

6. Line Circuit Breaker

The selection of the correct line circuit breaker depends on various factors. For detailed information for the rating of a line circuit breaker, please refer to section 6.4.3 "The Line Circuit Breaker" (Page 44).

No loads should be connected to this power circuit!



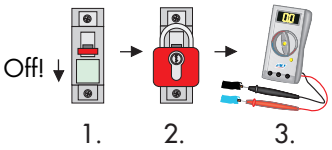
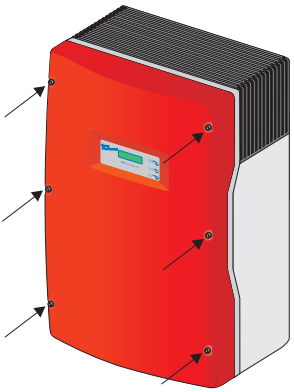
A circuit breaker's load disconnecting properties can be utilized to disconnect the inverter from the grid under load.

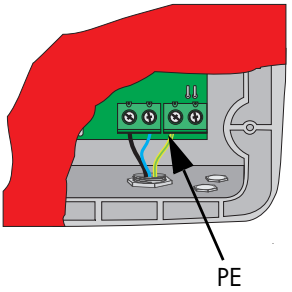
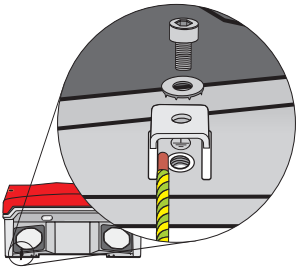
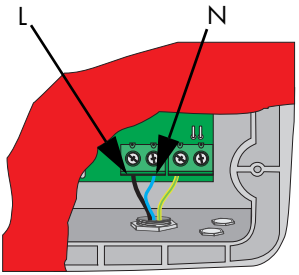
*A screw fuse element, e.g. D system (Diazed) or D0 system (Neozed) has no load disconnecting properties, and thus may be used as cable protection, but **not** as a load disconnection device.*

Upon disconnection under load, the fuse element may be destroyed, or its functionality may be inhibited by contact burning.

6.4.2 Connecting the AC Output

To connect up the AC output, follow these steps:

Step	Instruction
1	Check the grid voltage! For Germany, the following applies: If the grid voltage is constantly higher than 253 V, the Sunny Mini Central will not be fully operational. In this case, contact the local grid operator for assistance. The inverter can temporarily feed power into the grid with a maximum output voltage of 260 V. However, the 10-minute average must not exceed 253 V.
2	Isolate the grid connection (switch the line circuit breaker to its "off" position), make sure it cannot be switched back on, and test to make sure no voltage is present. 
3	Make sure that the PV generator is not connected to the inverter!
4	Remove the screws that secure the housing cover of the Sunny Mini Central. Put the screws and the washers to one side so that they do not get lost. Pull the cover forward to remove it. 

Step	Instruction
5	Connect the protective earth (PE) of the mains cable to the right terminal of the terminal block (see figure to the right). To do this, the PE wire must be 5 mm longer than the L and N wires!  PE conductor connection
	If a second protective earth connection is required, you can use the additional connection terminal directly on the Sunny Mini Central's housing for this purpose. Proceed as follows: 1. Insert the terminal clamp in the slits and screw the terminal half tight with the supplied M6x16 screw and washer. The toothing of the washer must face toward the terminal clamp. 2. Insert the stripped grounding cable. 3. Secure the terminal tightly. 
6	Connect the mains cable as shown in the figure. Use the supplied cable feed-through. **"L" and "N" must not be swapped!**  "L" and "N" connection

Step	Instruction
7	Secure the housing cover by evenly tightening the two middle screws first. Then tighten the four remaining screws as well and do not forget to also reattach the washers. The toothing of the washers must face toward the housing cover. The screws must be tightened with approximately 6 Nm torque in order to guarantee both the sealing of the housing and the grounding of the cover. **NOTICE! The grounding of the housing cover is ensured by the toothed washers. Take care that for all six screws, the washers are installed with the toothing against the cover!**

6.4.3 The Line Circuit Breaker

Factors that Determine the Selection

Various factors should be taken into account when selecting line circuit breakers. These include, for example:

- The type of cable used (conductor material and insulation)
- Ambient temperatures affect the cables (higher temperatures result in a reduced maximum current load)
- Method of routing the cable (reduces the maximum current load)
- Bundling cables together (reduces the maximum current load)
- Loop impedance [Z] (in the event of a body contact this limits the current that can flow and therefore determines the response behavior of the circuit breaker)
- Adequate separation between the circuit breakers to avoid excessive heating
- Selectivity
- Protection class of the connected load (VDE 0100, part 410, "Protection against electric shock")

When installing the fuses, please always take the information in the manufacturer's data sheets into account, e.g. in terms of installation distance and heat impact.

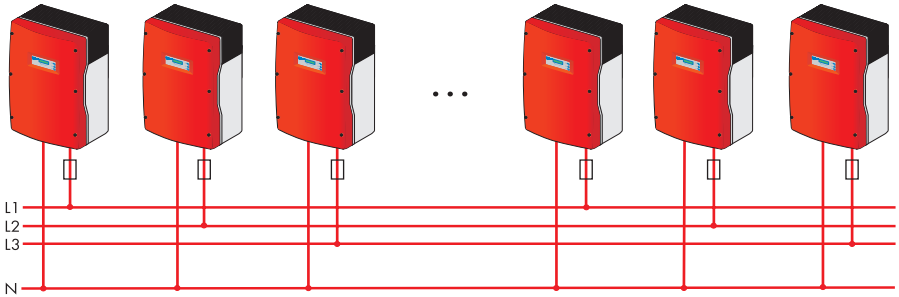
Also observe the following standards in all cases:

- *DIN VDE 0298-4 (Cable routing and current-carrying capacity)*
- *DIN VDE 0100, part 430 (Protective measures; protection of cable and cords against overcurrent)*
- *DIN VDE 0100, part 410 (Protective measures; protection against electric shock)*
- *Country-specific standards applicable at the installation site*

Rating of the Circuit Breakers

Example for the thermal rating for a line circuit breaker in a photovoltaic power-generating system operated in parallel with the low voltage grid.

We assume a PV system with 9 Sunny Mini Central inverters with three inverters per phase.



Required technical data of the Sunny Mini Central SMC 5000A / SMC 6000A

- Maximum output current = 26 A / 26 A
- Maximum permissible fuse protection for the Sunny Mini Central = 40 A

  The choice of cable together with the way it is routed, ambient temperatures and other underlying conditions limit the maximum fuse protection for the cable.
- In our example we assume that the chosen cable (6 mm²) is ideally routed and can take a nominal current of 32.2 A.

Selecting the line circuit breakers:

- The maximum possible nominal current for the cable used and the maximum possible fuse protection for the Sunny Mini Central limit the maximum possible nominal current for the line circuit breaker.
- In our example, 32 A is possible (SMC 6000A)
- Additionally, check the thermal suitability of the line circuit breakers!

Example for the thermal selection of a 32 A line circuit breaker with B sensitivity with no gap between the circuit breakers:

When selecting line circuit breakers, a number of load factors need to be taken into account. These can be found in the respective manufacturer's data sheets. For example, one manufacturer's circuit breaker may be designed for an ambient temperature of 50 °C.

Load factors according to data sheet specifications:

- Reduction through permanent load >1 h = 0.9 [a]
- Reduction factor when 9 circuit breakers are arranged side-by-side without gaps = 0.77 [b]
- Increase in nominal current as a result of ambient temperatures of 40 °C in the circuit breaker panel = 1.07 [c]

Result:

The nominal load current for the line circuit breaker is calculated as:

Ibn = 32 A x 0.9 x 0.77 x 1.07 = 23.7 A

Summary:

The selected line circuit breaker cannot be used in our example case since the maximum current-carrying capacity for fault-free operation is lower than the maximum output current of the inverter used. **It will trip under rated operating conditions!**

Solution 1:

Use a 35 A line circuit breaker. As a result, the maximum current-carrying capacity would be 26 A (Ibn = 35 A x 0.9 x 0.77 x 1.07 = 26 A) and the line circuit breaker will **not** trip under rated operating conditions.

However, you should consider the underlying conditions once again! In this case, you cannot use the previously selected 6 mm² cable anymore.

Solution 2:

Increase the distance between the line circuit breakers to 8 mm. This would mean that the reduction factor is 0.98 instead of 0.77. As a result, the maximum current-carrying capacity would be 30 A (Ibn = 32 A x 0.9 x 0.77 x 1.07 = 30 A) and the line circuit breaker will **not** trip under rated operating conditions.

Recommendation by SMA: solution 2

---

a. Permanent loads of longer than one hour are possible in photovoltaics.

b. When only one circuit breaker is used, this factor = 1.

c. Due to the fact that the circuit breakers are rated for 50 °C.

As well as the thermal rating of the circuit breakers, the applicable DIN VDE standards must also be taken into account. The main ones that apply here are:

- DIN VDE 0100, part 410
- DIN VDE 0100, part 430
- DIN VDE 0298, part 4

In special applications the relevant standards must be followed.

7 The Communication Interface

Installation or replacement of the communication interface is only to be carried out by a qualified electrician.

The communication interface is used to communicate with SMA communication devices (e.g. Sunny Boy Control, Sunny WebBox) or a PC with appropriate software (e.g. Sunny Data Control). Depending on the selected communication interface, up to 2500 inverters can be interconnected. Detailed information on this topic can be found in the communication device manual, or on the Internet at www.SMA.de.

This section describes the installation of the communication interface in the Sunny Mini Central. The detailed wiring diagram for each communication interface can be found in the communication device manual. This wiring diagram includes the following information:

- Details on the required cable type
- Which of the inverter's connections are used
- Whether jumpers need to be mounted, and if so, which jumpers
- Whether the cable shield needs to be connected to the PE

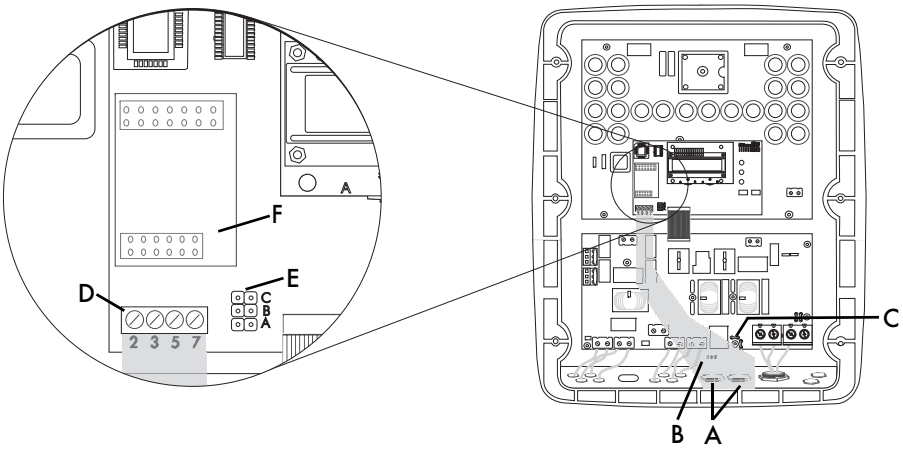
With the Sunny Mini Central SMC 5000A and SMC 6000A, communication via Powerline is not possible.

7.1 Connecting RS232, RS485, Sunny Beam

Electrostatic discharges are an acute danger to the Sunny Mini Central and to the communications interface. Ground yourself by touching PE or a non-coated part of the housing before removing the communication interface from the packaging, and before touching any components within the Sunny Mini Central.

Read the communication device manual before beginning installation work. Further wiring details can be found there.

Step	Instruction
1	Open the inverter as described in section 10.
2	Guide the PG screw fitting over the communication cable.
3	Thread the cable through the cable feed-through (A) on the Sunny Mini Central.
4	Screw the PG screw fitting onto the Sunny Mini Central.
5	Sheathe the cable inside the Sunny Mini Central using the silicone tube provided. The silicone tube is imperative for safety reasons. Without this silicone tube, the interface may not be operated.
6	Lay the cable in area (B) as shown in the figure to the right.
7	Ground the cable shield at the PE connector (C) if the connection plan of the communication device indicates this as necessary.
8	Connect the communication wires to the screw terminal strip (D) as described in the connection plan of the communication device. Note down the connector color coding for the respective pin numbers. Connecting the receiver incorrectly can damage the devices. • Pin 2 color: _____ • Pin 3 color: _____ • Pin 5 color: _____ • Pin 7 color: _____
9	Connect the jumpers (E) if the connection plan of the communication device indicates this as necessary. The table shown to the right provides an overview of the jumper functions.
10	Plug the communication interface to the left of the board (F).
11	Close the Sunny Mini Central as described in section 10.



A Housing feed-throughs in the base of the Sunny Mini Central

B Cable route (gray surface)

C PE connector

D Screw terminals for connection of the communication wires

E Jumper slots

F Interface port

7.1.1 Jumper Functions

	Jumper A	Jumper B	Jumper C
RS232	-	-	-
RS485	termination	bias 1	bias 2
Sunny Beam	-	-	-

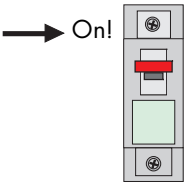
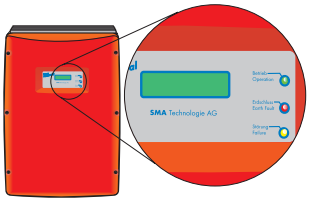
A detailed description of the jumper functions can be found in the communication device manual.

8 Commissioning the Sunny Mini Central

Proceed with commissioning the Sunny Mini Central only after:

- the housing cover is securely screwed shut,
- the DC cables (PV strings) are fully connected and the unused DC plug connectors on the bottom of the housing are closed using the protective caps,
- the Electronic Solar Switch is securely attached,
- the AC (power) cable is fully connected and
- the line circuit breaker is laid out correctly.

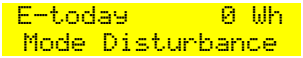
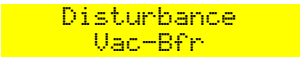
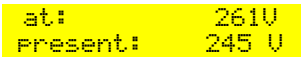
Commissioning Procedure

Step	Instruction	
1	First of all, switch the line circuit breaker to the "on" position.	
2	Now look at the LED or the display to check whether the Sunny Mini Central is in a fault-free operating status. If this is the case, commissioning was successfully completed. If the Sunny Mini Central shows other messages or blink codes than those described below, see the operating manual of the Sunny Mini Central for their precise meaning and possible solutions.	

8.1 Display

After a normal grid connection of the Sunny Mini Central, it takes approximately one minute until the following display messages are shown alternately. For this, the DC and AC connections must be wired correctly and the circuit breaker must be switched on. The display messages shown before that only have the purpose of indicating the initialization of the Sunny Mini Central and the process of controlling whether the power supply requirements are fulfilled.

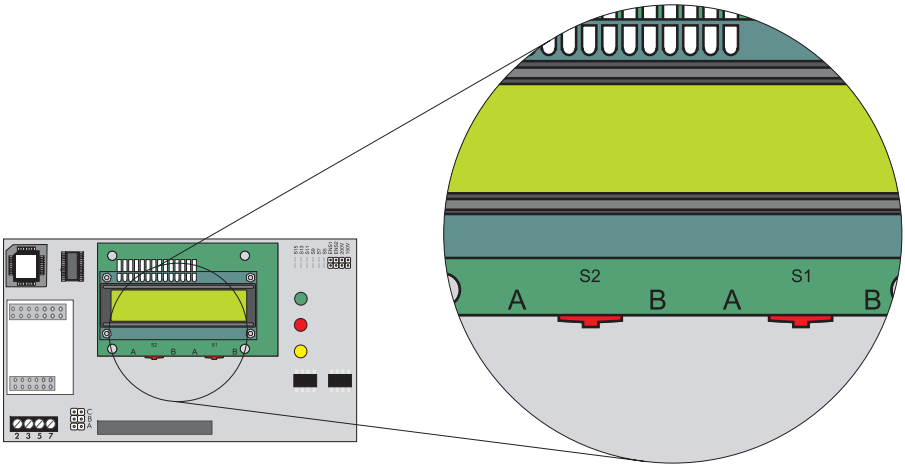
Display	Description
PV Overvoltage	
!PV-Overvoltage! !DISCONNECT DC !	**If the message on the left appears, the AC and DC cables must be disconnected from the Sunny Mini Central immediately! There is a risk of damage to the Sunny Mini Central resulting from excessive DC input voltage!** 1. Check the DC input voltage again to make sure it is within the limits stated in section 6.3.1 "Requirements" (Page 27). If the input voltage is too high, contact the planner / installer of the PV generator for assistance. 2. If despite checking the DC input voltages the display message occurs again when the PV generator is connected to the Sunny Mini Central, disconnect the PV generator from the Sunny Mini Central again and contact SMA (see section 15 "Contact" (Page 92)).
Working Mode	
E-today 0 Wh Mode MPP	The energy generated today and the current operating mode are displayed first.
Pac 903W Vpv 260V	The current feed-in output and the solar generator voltage are displayed after 5 seconds or when you tap the housing cover.
E-total 0Wh h-total 0h	After a further 5 seconds, or when you tap again, the total energy produced and the time the converter has been connected to the grid are displayed. Then the cycle begins again.

Display	Description
In case of failures	
	In case of a failure, the message "Disturbance" will be indicated in the status bar.
	The exact error message follows. For example, if the "Disturbance" message shown here is displayed immediately after connection, it may be due to the fact that the AC wire is not correctly connected or the circuit breaker is not switched on.
	If a measured value is responsible for the fault condition, then the value measured at the time of the fault is displayed. If another measurement is possible, the current value is displayed in the second line.
Please refer to the operating manual of the Sunny Mini Central to read the exact explanation of the error and status messages!	

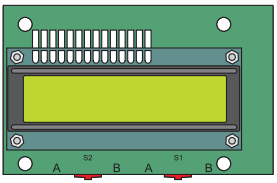
8.1.1 Setting the Language of the Sunny Display

You can set the language of the Sunny Display using the switches on the underside of the display assemblies inside the Sunny Mini Central. Proceed as follows:

1. Open the Sunny Mini Central as described in section 10.2 "Opening of the Sunny Mini Central" (Page 59).
2. Set the switches for the required language, as shown below.



Language	Switch S2	Switch S1
German	B	B
English	B	A
French	A	B
Spanish	A	A



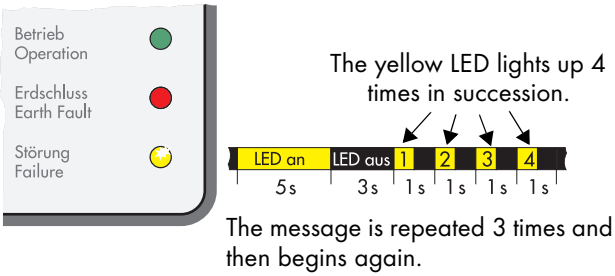
3. Close the Sunny Mini Central as described in section 10.3 "Closing of the Sunny Mini Central" (Page 60).

8.2 LEDs

After a normal grid connection of the Sunny Mini Central, it takes approximately one minute until the following blink code is displayed. For this, the DC and AC inputs must be correctly connected and the circuit breaker must be activated. The blink codes shown before that only have the purpose of indicating the initialization of the Sunny Mini Central and the process of controlling whether the power supply requirements are fulfilled.

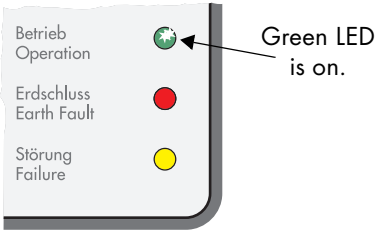
PV Overvoltage

If the blink code shown below appears, the AC and DC cables must be disconnected from the Sunny Mini Central again immediately! There is a risk of damage to the Sunny Mini Central resulting from excessive DC input voltage.



1. Check the DC input voltage again to make sure it is within the limits stated in section 6.3.1 "Requirements" (Page 27). If the input voltage is too high, contact the planner / installer of the PV generator for assistance.
2. If despite checking the DC input voltage the blink code occurs again when the PV generator is connected to the Sunny Mini Central, disconnect the PV generator from the Sunny Mini Central again and contact SMA (see section 15 "Contact" (Page 92)).

Working Mode



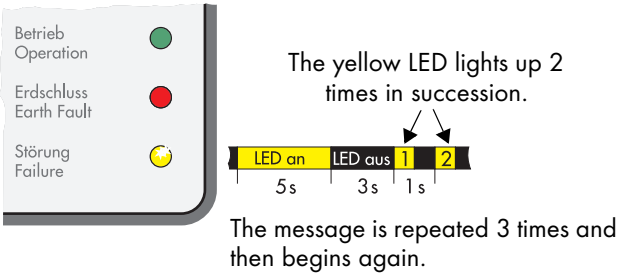
The Sunny Mini Central is in normal working mode.

The green LED is continuously on.

In Case of Failures

In case the Sunny Mini Central detects an error, this is indicated through a blink code of the yellow and red LEDs.

For example, if the yellow LED glows for 5 seconds immediately after connection, then goes out for 3 seconds and then flashes briefly twice, there is a grid fault. In this case, that may be due to the fact that the AC cable has not yet been cabled correctly or that the line circuit breaker has not been switched on yet.



Please refer to the operating manual of the Sunny Mini Central to read the exact explanation of the blink codes!

9 Hand-over to the Operator

After installing the Sunny Mini Central successfully, hand the system over to the operator. To do so, please use the following check list.

No.	Checkpoint	Control
What the operator should know:		
1	operating principles of the PV system	
2	switching the PV system on and off	
3	meaning of the LEDs and display messages	
4	maintenance and cleaning (handle covers, LEDs, display,...)	
5	handling of additional communication components	
6	contact partner in case of a failure	
7	keep the documents to hand close to the Sunny Mini Central	
The following documents are handed over to the operator:		
1	operating manual of the Sunny Mini Central	
2	installation guide of the Sunny Mini Central	
3	declaration of conformity of the Sunny Mini Central	
4	if necessary, all manuals for additional components (interfaces, data logger, etc.)	
5	data sheet for the solar modules used	
6	diagram of the layout of the solar modules and their wiring	
7	current circuit diagram of the unit	
8	the complete registration and commissioning documents of the local energy supply company	

10 Opening and Closing the Sunny Mini Central

10.1 Safety Instructions

Follow all safety instructions described in section 3 "Safety Instructions" (Page 9).

High voltages are present in the device!

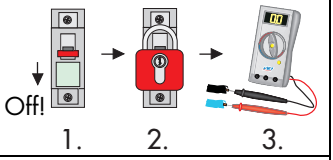
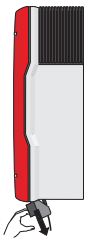
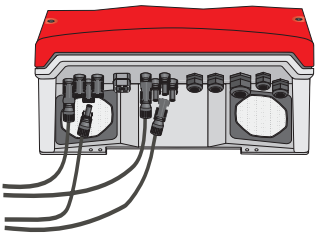
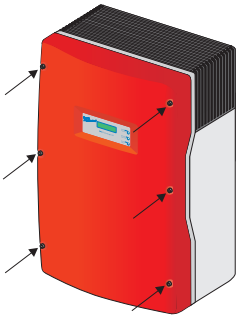
Inappropriate opening or closing of the Sunny Mini Central can cause serious material damage or injury to persons which could be fatal.

Before working on the Sunny Mini Central with the cover removed, the AC and DC voltages must therefore be disconnected from the Sunny Mini Central and the capacitors must be discharged (wait for 30 minutes after isolating the AC and DC voltage).

When working on the Sunny Mini Central and handling the module assemblies, remember to observe all ESD safety regulations. Electronic components are susceptible to electrostatic charge. Discharge any electrostatic charge by touching the grounded housing while handling any electronic component.

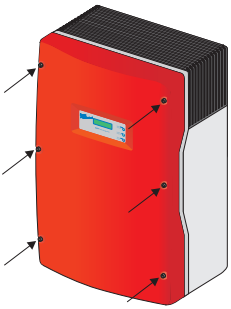
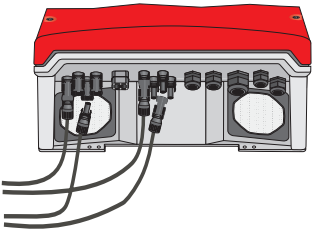
10.2 Opening of the Sunny Mini Central

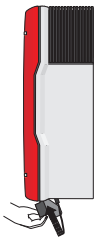
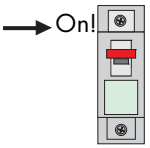
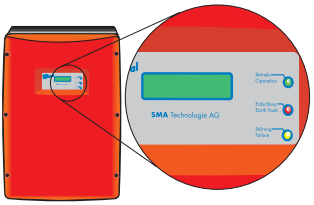
Follow the sequence described below and all safety instructions in section 10.1 "Safety Instructions" (Page 58)!

Step	Instruction
1	Switch the line circuit breaker to its "off" position, make sure it cannot be switched back on, and test to make sure no voltage is present. 
2	Pull the handle of the Electronic Solar Switch off the Sunny Mini Central. Be sure to pull the handle downwards and slightly towards the wall. There is a contact in the middle that automatically starts the switching process when the handle is pulled. 
3	Directly after pulling off the Electronic Solar Switch, pull out the DC plug connectors from the Sunny Mini Central to totally disconnect the PV generator from the Sunny Mini Central. 
4	**Wait for 30 minutes for the capacitors inside the Sunny Mini Central to discharge.**
5	Remove the six screws from the housing cover and pull the cover forward smoothly. Put the cover, the screws and the washers to one side so that they do not get lost. 

10.3 Closing of the Sunny Mini Central

Follow the sequence described below and all safety instructions in section 10.1 "Safety Instructions" (Page 58)!

Step	Instruction
1	Secure the housing cover by evenly tightening the two middle screws with the corresponding washers first. The toothing of the washers must face toward the housing cover. The screws must be tightened with approximately 6 Nm torque in order to guarantee both the sealing of the housing and the grounding of the cover. Then tighten the four remaining screws as well. If you should lose a screw or washer, the Sunny Mini Central accessories kit contains a spare screw and spare washer. 
	NOTICE! The grounding of the housing cover is ensured by the toothed washers. Take care that for all six screws, the washers are installed with the toothing against the cover!
2	Connect the PV generator by reconnecting the DC plug connectors of the Sunny Mini Central with those of the strings. Close the unused DC input sockets with the caps included in the delivery. 
3	Check the Electronic Solar Switch for wear, as described in section 12.2 "Inspection of the Electronic Solar Switch" (Page 72).

Step	Instruction
4	Reinsert the handle of the Electronic Solar Switch in the socket on the underside of the Sunny Mini Central. 
	The Electronic Solar Switch can be damaged if it has not been attached properly. The handle must be firmly attached to the Electronic Solar Switch's socket, and rest against the housing. Check that the handle is positioned correctly before recommissioning the inverter.
5	Switch the line circuit breaker to the "on" position. 
6	Check whether the display or the LEDs on the Sunny Mini Central indicate that the device is functioning correctly (see section 8 "Commissioning the Sunny Mini Central" (Page 51)). 

11 Troubleshooting / Problem Solving

The Sunny Mini Central is a complex high-technology device. As a result, the possibilities for fixing faults on site are limited to just a few items. Should the Sunny Mini Central display other blink codes or display messages than those described in section 8 "Commissioning the Sunny Mini Central" (Page 51), please refer to the operating manual of the Sunny Mini Central to find the exact explanation of the display message or the blink code and details on troubleshooting.

Do not attempt any other repairs than those described here, but instead use the 24-hour replacement service (the Sunny Mini Central is made ready for shipping within 24 hours and then given to a shipping company) and the repair service of **SMA** Technologie AG.

Inappropriate problem solving may cause serious injury to persons or material damage. Faults must therefore be corrected by a trained electrician.

11.1 overview

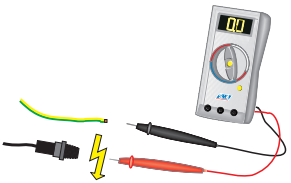
Green	Red	Yellow	Plant status
glows continuously	is not glowing	is not glowing	OK (working mode)
	glows continuously	is not glowing	failure
		glows continuously	OK (initialization)
flashes quickly (3 x per second)	is not glowing	is not glowing	OK (stop)
	glows continuously	is not glowing	failure
flashes slowly (1x per second)	is not glowing	is not glowing	OK (waiting, grid monitoring)
briefly goes off (approx. 1 x per second)	glows continuously	is not glowing	failure
	is not glowing	is not glowing	OK (derating)
	glows continuously	is not glowing	failure
is not glowing	is not glowing	is not glowing	OK (overnight shutdown)
		glowing/flashing	failure
	glows continuously	is not glowing	failure
		glowing/flashing	failure

11.2 The red LED is Continuously on

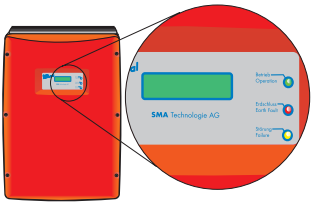
11.2.1 Ground Fault Testing

If the red LED on the Sunny Mini Central is continuously illuminated, it should be checked whether there is a ground fault in the PV generator.

Follow the safety instructions in section 10.1 "Safety Instructions" (Page 58) and proceed as follows:

Step	Instruction
1	Disconnect the Sunny Mini Central from both the DC and AC connections, as described in section 10.2 "Opening of the Sunny Mini Central" (Page 59).
2	Taking one DC plug connector at a time, measure the voltages between one DC plug connector of a string and ground potential. Pay attention to all safety instructions! 
	WARNING! Dangerously high voltages may be present. Danger of death! Make sure that you only use measuring devices with a DC input voltage range up to at least 600 V!
	If the measured voltages are constant and their total is roughly the same as the open circuit voltage of the string, then there is a ground fault in this string. Its approximate location can be deduced from the relationships between the voltages.

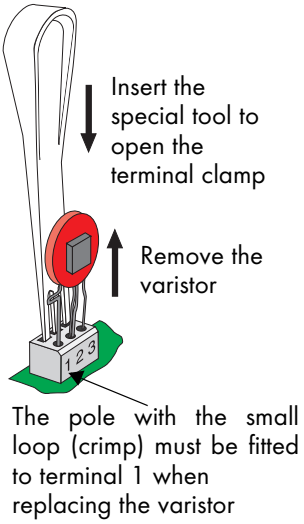
<table>
<tr><th>Step</th><th>Instruction</th></tr>
<tr><td>3</td><td>Repeat points 3 and 4 for each string.

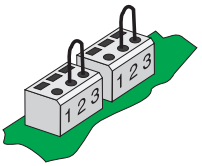
<table><tr><th>Event</th><th>Measure</th></tr><tr><td>You have found a ground fault.</td><td>Restart the Sunny Mini Central as described from step 7 onwards, but without reconnecting the faulty string. The PV generator's installation engineer has to fix the ground fault before you can reconnect this string.</td></tr><tr><td>You have found no ground fault.</td><td>It is likely that one of the thermally monitored varistors is defective. In this case, proceed as described in section 11.2.2 "Checking the Varistors" (Page 65).</td></tr></table></td></tr>
<tr><td>4</td><td>Commission the Sunny Mini Central as described in section 10.3 "Closing of the Sunny Mini Central" (Page 60).</td></tr>
<tr><td>5</td><td>Check whether the display or the LEDs on the Sunny Mini Central indicate that the device is functioning correctly (see section 8 "Commissioning the Sunny Mini Central" (Page 51)).
  </td></tr>
</table>

11.2.2 Checking the Varistors

Varistors are wearing parts. Their functioning diminishes with age or following repeated responses as a result of overvoltages. It is therefore possible that one of the thermally monitored varistors has lost its protective function. You can now check these varistors in the following way, paying attention to the safety instructions in section 10.1 "Safety Instructions" (Page 58):

<table>
<tr><th>Step</th><th colspan="2">Instruction</th></tr>
<tr><td>1</td><td colspan="2">Open the Sunny Mini Central as described in section 10.2 "Opening of the Sunny Mini Central" (Page 59).</td></tr>
<tr><td>2</td><td colspan="2">Use a continuity tester to check all the varistors and see if there is a conducting connection between connectors 2 and 3. The positions of the varistors in the Sunny Mini Central can be seen in the figure in section 4 "Overview of the Device" (Page 12).</td></tr>
<tr><td></td><td>Event</td><td>Measure</td></tr>
<tr><td></td><td>There is a conducting connection.</td><td>It is likely that there is a different fault in the Sunny Mini Central which has activated the blink code.
Close the Sunny Mini Central again as described in section 10.3 "Closing of the Sunny Mini Central" (Page 60) and contact the SMA Serviceline to discuss further steps.</td></tr>
<tr><td></td><td>There is no conducting connection.</td><td>The respective varistor is not working and must be replaced.
The varistors are specially manufactured for use in the Sunny Mini Central and are not commercially available. They must be ordered directly from SMA Technologie AG (SMA order code: "SB-TV4").
To replace the part, proceed to step 3.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Instruction</th></tr>
<tr><td>3</td><td>Replace the varistor concerned with a new one as shown in the illustration to the right. Ensure the varistor is installed the right way round! If you do not receive a special tool for operating the terminal clamps together with your replacement varistors, please contact SMA. As an alternative, the terminal contacts can be operated using a suitable screwdriver. Since the failure of one varistor is generally due to factors that affect all varistors in a similar way (temperature, age, inductive overvoltages), you should replace both varistors, not just the one that is obviously defective.
 
Insert the special tool to open the terminal clamp
Remove the varistor
1 2 3
The pole with the small loop (crimp) must be fitted to terminal 1 when replacing the varistor

 If no replacement varistors are locally available, the Sunny Mini Central can temporarily run without them. To do this, remove the varistors you identified as being faulty as described above and in their place, bridge the terminals 2 and 3 with a length of wire.


 An input modified in this way is no longer protected against overvoltages! Replacement varistors should be obtained as soon as possible. In systems with a high risk of overvoltages, the Sunny Mini Central must not be operated without varistors.</td></tr>
<tr><td>4</td><td>Close the Sunny Mini Central as described in section 10.3 "Closing of the Sunny Mini Central" (Page 60).</td></tr>
</table>

12 Maintenance and Cleaning

The Sunny Mini Central has been constructed so that maintenance is kept to a minimum. To guarantee safe operation, it is usually adequate to observe the following principles:

- Check the Sunny Mini Central visually for damage approximately every two months.
- If necessary, clean the LEDs and the display with a damp cloth. Solvents, abrasives or corrosive liquids must not be used.
- Regularly check that the display and the LEDs indicate the device is functioning correctly. If necessary, correct faults using the explanation of the blink codes and display messages contained in the operating manual of the Sunny Mini Central.

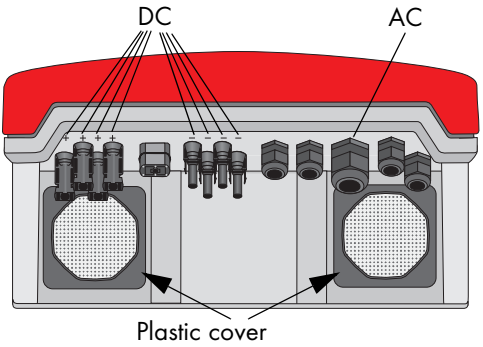
  This information can also be obtained by using one of the communication options.
- Check the heat dissipation as described in section 12.1 "Checking Heat Dissipation" (Page 67), if, during a visual inspection, you notice a marked build-up in the fan guard or if the inverter is increasingly in derating mode (see explanation of the blink codes and display messages in the operating manual of the Sunny Mini Central).
- Check the Electronic Solar Switch for wear every time before recommissioning, as described in section 12.2 "Inspection of the Electronic Solar Switch" (Page 72).

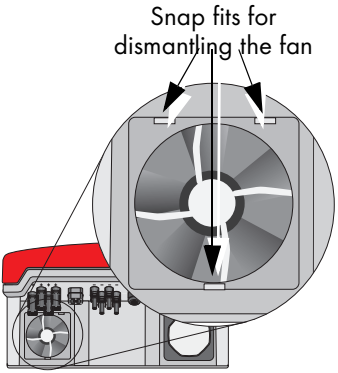
12.1 Checking Heat Dissipation

12.1.1 Cleaning the Fans

If the fan guards are only covered in loose dust, they can be cleaned with a vacuum cleaner. If you do not achieve satisfactory results with a vacuum cleaner, you can dismantle the fans to clean them.

The Sunny Mini Central is fitted with two fans on its underside. In order to clean the fans, proceed as follows:



Step	Instruction
1	Disconnect the Sunny Mini Central from both the DC and AC connections, paying attention to the safety instructions in section 3 "Safety Instructions" (Page 9).
2	Wait for the fans to stop rotating.
3	Push the two latches at the upper edge of the black plastic cover to one side and remove it carefully with the fan guards mounted behind. Clean the fan guards with a soft brush, a paint brush, a cloth or compressed air. If the fans are very dirty, you can clean them following the procedure laid out from step 4 onwards.
4	The fans are attached to the housing via three snap fits. Press the two front snap fits back and the rear snap fit forwards. 
5	Remove the fans by pulling them slowly and carefully downwards. The fan cables are long enough that you can lift the fans far enough out to disconnect the internal plug in the Sunny Mini Central. To do so, unlock the corresponding plugs and remove them. You can now take out the fans and clean them.
6	Clean the fans with a soft brush, a paint brush or a cloth and water. Under no circumstances should you use compressed air to clean the fans as this can damage them.
7	After cleaning, replace everything in reverse order. Subsequently, check that the fans are functional as described in the next section.

12.1.2 Checking the Fans

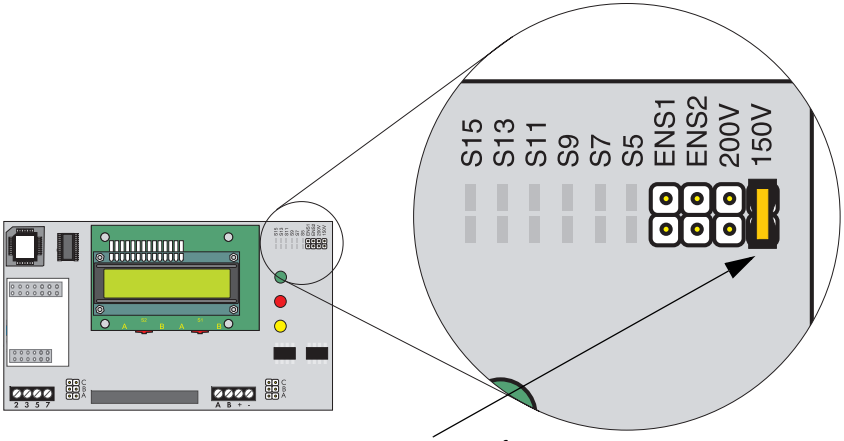
If necessary, there are two different ways to check the fans are functional:

- Set the "Fan Test" parameter to "1" in the installer mode (using Sunny Data, Sunny Data Control, the Sunny Boy Control data logger or Sunny WebBox), or
- place the jumper on the controller board (the jumper required to check the fans is included in the Sunny Mini Central accessories kit).

Check the fans as follows:

Step	Instruction
Setting the Parameter	
1	Request the installer password on the SMA Serviceline (contact: see Page 92).
2	Set the "Fan Test" parameter to "1" in the installer mode (using Sunny Data, Sunny Data Control, the Sunny Boy Control data logger or Sunny WebBox).
3	Check the fans' air-flow. The Sunny Mini Central sucks air in from underneath and then blows it back out on the upper sides. Listen for any unusual noise, which could indicate incorrect installation or that the fans are faulty.
4	After checking the fans, set the "Fan Test" parameter back to 0.

Step	Instruction
Setting the Jumper	
1	Open the Sunny Mini Central as described in section 10.2 "Opening of the Sunny Mini Central" (Page 59).
2	Place the jumper on the controller board socket, as laid out below.



Jumper position for checking the fans

3	Close the Sunny Mini Central as described in section 10.3 "Closing of the Sunny Mini Central" (Page 60).
4	The Sunny Mini Central recognizes the jumper only after the system has been restarted (i.e. all LEDs must have gone out before a restart).
5	Check the fans' air-flow. The Sunny Mini Central sucks air in from underneath and then blows it back out on the upper sides. Listen for any unusual noise, which could indicate incorrect installation or that the fans are faulty.
6	Once you have checked the fans, remove the jumper. Open and close the Sunny Mini Central as described in section 10 "Opening and Closing the Sunny Mini Central" (Page 58).

12.1.3 Cleaning the Handle Covers

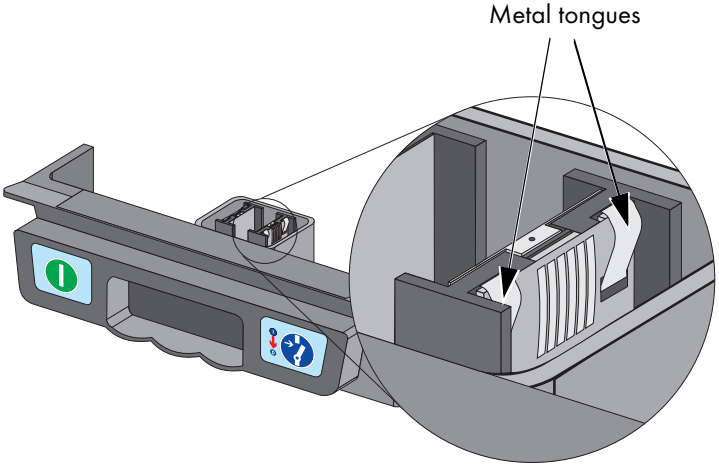
There are handle covers on either side of the Sunny Mini Central. The Sunny Mini Central sucks air in from underneath via the fan and blows it out again on the upper sides. For optimum heat dissipation within the device, you have to clean both handle covers. Proceed as follows when cleaning the handle covers:

Step	Instruction
1	The handle covers of the Sunny Mini Central are to be found on the sides of the housing. Place your fingers in the space between the top of the housing and the handle covers and gently pull the handle covers out of their bracket.
2	Clean the handle covers with a soft brush, a paint brush or compressed air.
3	Insert the handle covers back into the Sunny Mini Central. The handle covers can only be inserted on the right or left side of the Sunny Boy respectively. To help you identify the sides, "links/left" or "rechts/right" is printed on the inside of the handle covers.
	The handle covers must not be removed permanently, because otherwise the device is not protected against the entrance of insects! If required, you can order new handle covers from SMA (contact: see Page 92).

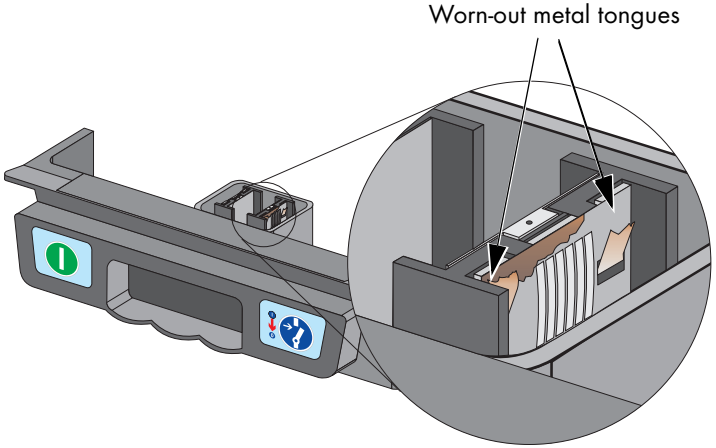
12.2 Inspection of the Electronic Solar Switch

Check the Electronic Solar Switch for wear before you attach it.

To do this, check the metal tongues on the inside of the plug for brown discoloration.



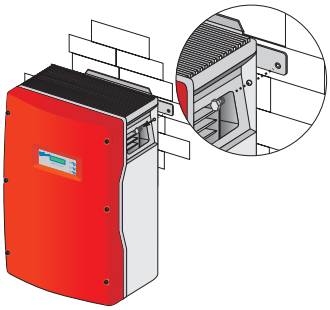
If one of the metal tongues is completely burned out (see figure below), then the Electronic Solar Switch can no longer safely disconnect the DC side. Replacements for damaged Electronic Solar Switch handles are available from SMA.

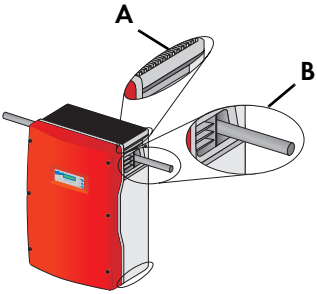


13 Decommissioning

13.1 Disassembly

You must follow the sequence described below and all safety instructions in sections 3 and 10.1!

Step	Instruction
1	Open the Sunny Mini Central as described in section 10.2 "Opening of the Sunny Mini Central" (Page 59).
2	Disconnect the AC cable.
3	Close the Sunny Mini Central with the six screws and the corresponding washers.
4	Remove the two screws on the left and right side of the Sunny Mini Central that attach it to the wall bracket. 
5	Disconnect the anti-theft protection, if applicable.
6	Remove the Sunny Mini Central upwards, keeping it in vertical position.
7	**Remember that the Sunny Mini Central weighs 63 kg!**

Step	Instruction	
8	When transporting the Sunny Mini Central, use the ergonomic handles at the top and bottom at the sides of the Sunny Mini Central (A) or the housing opening, for example, by sliding a steel bar through it (B) (diameter max. 30 mm).	

13.2 Packaging

If possible, please pack the Sunny Mini Central in the original packaging. If this is no longer available, a similar box can be used which can withstand the weight of the Sunny Mini Central (63 kg), has a handle system and can be closed fully.

13.3 Storage

Store the Sunny Mini Central in a dry place where ambient temperatures are always between -25 °C and +60 °C.

13.4 Disposal

Dispose of the Sunny Mini Central at the end of its service life in accordance with the disposal regulations for electronic scrap which apply at the installation site at that time. Alternatively, send it back to SMA with shipping paid by sender, and labeled "FOR DISPOSAL" (contact: see Page 92).

14 Technical Data

14.1 Sunny Mini Central SMC 5000A

Description	Short descr.	Setting
PV Generator Connection Data		
Max. input open circuit voltage	$U_{PV\ 0}$	600 V (based on -10 °C cell temperature)
Input voltage, MPP range	U_{PV}	213 V - 600 V @ UACmin (246 V - 600 V DC @ 230 V AC)
Max. input current	$I_{PV,\ max}$	26 A
Max. input power	P_{DC}	5750 W
All-pole isolator on the DC input side		DC plug connector
Overvoltage protection		thermally monitored varistors
Voltage ripple	U_{PP}	< 10 % of the input voltage
Personal protection		Insulation monitoring (Riso > 1 MW)
Operating consumption		< 7 W
Reverse polarity protection		via short-circuit diode

Description	Short descr.	Setting
Grid Connection Data		
Nominal output power	P_{ACnom}	5000 W
Peak output power	$P_{AC, max}$	5500 W
Nominal output current	I_{ACnom}	21.7 A
Max. output current	$I_{AC, max}$	26 A
Harmonic distortion of output current (at KUgrid < 2 %, PAC > 0.5 PACnom)	K_{IAC}	< 4 %
Short-circuit proofing		current control
Nominal operational voltage	U_{ACnom}	230 V
Operating range, grid voltage (complying with DIN VDE 0126-1-1)	U_{AC}	198 ... 253 V / 260 V[a]
Voltage range (extended operating range)	U_{AC}	180 V - 265 V
Nominal operating frequency	f_{ACnom}	50 Hz / 60 Hz
Operating range, grid frequency (complying with DIN VDE 0126-1-1)	f_{AC}	47.5 Hz - 50.2 Hz
Frequency range (extended operating range)	f_{AC}	50 Hz: 45.5 Hz - 54.5 Hz 60 Hz: 55.5 Hz - 64.5 Hz
All-pole isolator on grid side		automatic disconnection device (SMA grid guard 2)
Power factor	cos phi	1
Overvoltage category		III
Test voltage (50 Hz)		2 kV
Test surge voltage		4 kV (serial interface: 6 kV)
Operating consumption in night mode		0.25 W

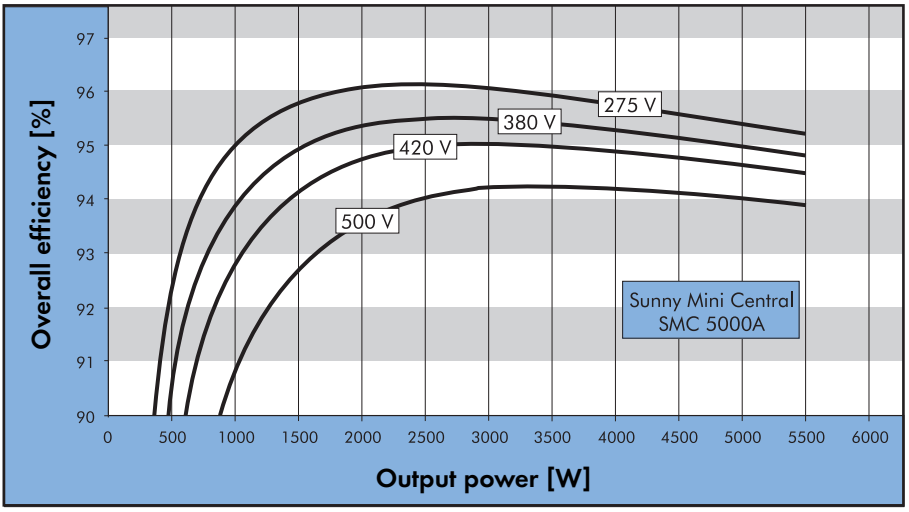
Description	Short descr.	Setting
Efficiency		
Max. efficiency	ηmax	96,1 %
CEC rebate efficiency	euro	95,2 %
Weight		
Weight		approx. 62 kg

a) The Sunny Mini Central can temporarily feed power into the grid with a maximum output voltage of 260 V. However, DIN VDE 0126-1-1 stipulates that the average voltage over 10 minutes must not exceed 253 V. That means for example, if the grid voltage is constantly 254 V, the inverter disconnects itself from the grid. In this case, contact the local grid operator for assistance.

DIN VDE 0126-1-1 only applies in Germany. See section 14.4.3 "Country-specific Parameter Settings" (Page 89) for all other preset country values of your inverter.

Efficiency Curve of the SMC 5000A

The efficiency of the Sunny Mini Central depends mainly on the input voltage of the connected PV strings. The lower the input voltage, the higher the efficiency.



14.2 Sunny Mini Central SMC 6000A

Description	Short descr.	Setting
PV Generator Connection Data		
Max. input open circuit voltage	$U_{PV\ 0}$	600 V (based on -10 °C cell temperature)
Input voltage, MPP range	U_{PV}	213 V - 600 V @ UACmin (246 V - 600 V DC @ 230 V AC)
Max. input current	$I_{PV,\ max}$	26 A
Max. input power	P_{DC}	6300 W
All-pole isolator on the DC input side		DC plug connector
Overvoltage protection		thermally monitored varistors
Voltage ripple	U_{PP}	< 10 % of the input voltage
Personal protection		insulation monitoring (Riso > 1 MW)
Operating consumption		< 7 W
Reverse polarity protection		via short-circuit diode

Description	Short descr.	Setting
Grid Connection Data		
Nominal output power	P_{ACnom}	6000 W
Peak output power	$P_{AC, max}$	6000 W
Nominal output current	I_{ACnom}	26 A
Max. output current	$I_{AC, max}$	26 A
Harmonic distortion of output current (at KUgrid < 2 %, PAC > 0.5 PACnom)	K_{IAC}	< 4 %
Short-circuit proofing		current control
Nominal operational voltage	U_{ACnom}	230 V
Operating range, grid voltage (complying with DIN VDE 0126-1-1)	U_{AC}	198 ... 253 V / 260 V[a]
Voltage range (extended operating range)	U_{AC}	180 V - 265 V
Nominal operating frequency	f_{ACnom}	50 Hz / 60 Hz
Operating range, grid frequency (complying with DIN VDE 0126-1-1)	f_{AC}	47.5 Hz - 50.2 Hz
Frequency range (extended operating range)	f_{AC}	50 Hz: 45.5 Hz - 54.5 Hz 60 Hz: 55.5 Hz - 64.5 Hz
All-pole isolator on grid side		automatic disconnection device (SMA grid guard 2)
Power factor	cos phi	1
Overvoltage category		III
Test voltage (50 Hz)		2 kV
Test surge voltage		4 kV (serial interface: 6 kV)
Operating consumption in night mode		0.25 W

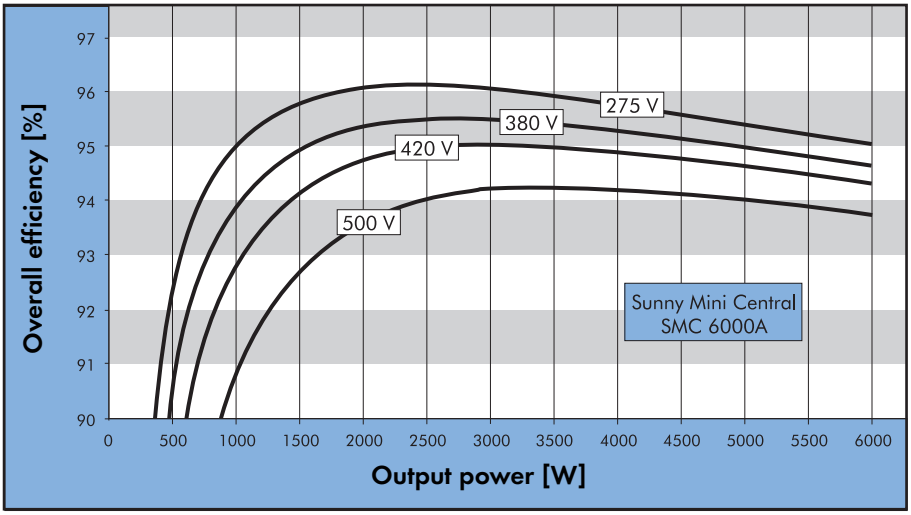
Description	Short descr.	Setting
Efficiency		
Max. efficiency	max	96.1 %
CEC rebate efficiency	euro	95,2 %
Weight		
Weight		approx. 63 kg

a) The Sunny Mini Central can temporarily feed power into the grid with a maximum output voltage of 260 V. However, DIN VDE 0126-1-1 stipulates that the average voltage over 10 minutes must not exceed 253 V. That means for example, if the grid voltage is constantly 254 V, the inverter disconnects itself from the grid. In this case, contact the local grid operator for assistance.

DIN VDE 0126-1-1 only applies in Germany. See section 14.4.3 "Country-specific Parameter Settings" (Page 89) for all other preset country values of your inverter.

Efficiency of the SMC 6000A

The efficiency of the Sunny Mini Central depends mainly on the input voltage of the connected PV strings. The lower the input voltage, the higher the efficiency.



14.3 General Data

General Data	
Protection rating in accordance with DIN EN 60529	IP65
Climatic conditions (DIN EN 50178:1998-04):	
Location of type C:	class 4K4H Extended temperature range: -25 °C to +60 °C Extended humidity range: 0 - 100 % Extended air pressure range: 79.5 kPa to 106 kPa
Transport of type E:	class 2K3 Temperature range: -25 °C to +70 °C
Max. operating altitude	2000 m above sea level
Fan connections	designed for safe disconnection in accordance with DIN EN 50178:1998-04
Dimensions (W x H x D)	468 mm x 613 mm x 242 mm (approx.)
External Interfaces	
Data transfer via separate data cable	optional, (RS232 / RS485, galvanically isolated)
Wireless data transmission	optional
Electronic Solar Switch (ESS)	
Mechanical service life (without current):	min. 1,000 switching processes
Electrical service life (in case of short circuit, with nominal current of 30 A):	min. 50 switching processes
Max. switching current	30 A
Max. switching voltage	800 V
Max. PV power	approx. 10 kW
Protection rating when plugged	IP65
Protection rating when unplugged	IP21

14.4 Sunny Mini Central Operating Parameters

Unauthorized changes to the operating parameters may result in:

- **injury or accidents as a result of changing the internal safety specifications of the Sunny Mini Central,**
- **voiding the Sunny Mini Central operating approval certificate,**
- **voiding the Sunny Mini Central warranty.**

Never change the parameters of your Sunny Mini Central without express authorization by the local energy supply company and instructions from SMA.

14.4.1 Explanation of the Operating Parameters

Name	Explanation
ACVtgRPro	Voltage rise protection (only relevant for Germany). The Sunny Mini Central can feed into the public grid with up to 260 V AC. However, DIN VDE 0126-1-1 stipulates that the average AC voltage over 10 minutes must not exceed 253 V. If the average over 10 minutes exceeds the threshold value of 253 V, the Sunny Mini Central disconnects itself from the grid. Once the average over 10 minutes returns to a value of less than 253 V, the Sunny Mini Central returns to "Working" mode. If voltage rise protection is not required in the relevant grid area (outside Germany), it can be deactivated by presetting the LDVtgC parameter. In this event, only the fast cut-off via the Uac-Max parameter intervenes.
AntiIsland-Ampl	Amplification of the anti-islanding process (deactivated for GER by setting AntiIsland-Ampl = 0)
AntiIsland-Freq	Repetition rate of the anti-islanding process (deactivated for GER by setting AntiIsland-Ampl = 0)
Betriebsart	Operating mode of the Sunny Mini Central: • *MPP*: Maximum Power Point • *Turbine Mode*: operating mode for Sunny Mini Central at a wind turbine • *UKonst*: constant voltage mode (nominal voltage is defined in "Usoll-Konst") • *IKonst*: operating mode for test purposes • *Stopp*: disconnection from grid, no operation • *Off Grid*: operating mode of the Sunny Mini Central in a stand-alone grid

Name	Explanation
Control	Current regulation switching. If the operating parameter "Control" is set to "Auto", the inverter automatically chooses the optimal type of current regulation. If the operating parameter "Control" is set to "Grid", the inverter regulates on the grid side. If set to "Bridge", the inverter regulates on the bridge side. This setting can be a corrective measure in the event of difficult grid characteristics. Discuss the alteration of this parameter with the SMA Serviceline.
Default	Used for setting country-specific information. • *GER/VDE0126-1-1*: country-specific parameter settings for Germany in accordance with DIN VDE 0126-1-1 • *SP/RD1663*: country-specific parameter settings for Spain • *AUS/AS4777*: country-specific parameter settings for Australia • *IT/DK5950*: country-specific parameter settings for Italy • *GB/G83*: country-specific parameter settings for Great Britain • *Other*: parameter settings can be defined here for countries where no predefined setting exists. • *Trimmed*: If country-specific parameters have been changed, "trimmed" is shown on the display. • *Off_Grid*: Setting for inverters which are operated in a stand-alone grid. More detailed information can be found in the Sunny Island manual.
dFac-Max	Maximum "grid frequency change" before the grid monitoring system disconnects the device from the grid.
dZac-Max	Maximum "grid impedance change" before the grid monitoring system disconnects the device from the grid.
E_Total	Total energy yield of the inverter. This change may be necessary when you exchange your Sunny Mini Central and want to use the data from the old device.
Fac-delta-	Maximum frequency, above (Fac-delta+) and below (Fac-delta-) the grid frequency, before the grid monitoring system disconnects the device from the grid.
Fac-delta+	
Fac-Limit delta	For setting the frequency-dependent output derating in the operating mode "Off Grid". Further information on this topic can be found in the Sunny Island operating manual.

Name	Explanation
Fac-Pderating	Frequency-dependent output limitation.
Fac-Start delta	For setting the frequency-dependent output derating in the operating mode "Off Grid". Further information on this topic can be found in the Sunny Island operating manual.
Fac-Tavg	Averaging time of grid frequency measurement.
Fan-Test	By setting the "Fan-Test" parameter to "1" you can check functionality of the fan.
Hardware-BFS	Hardware version of the operation control unit (BFR)
h_Total	Total hours of operation for the inverter. This change may be necessary when you exchange your Sunny Mini Central and want to use the data from the old device.
I-NiTest	Setting the impulse for impedance monitoring. This parameter only functions when the Sunny Mini Central is deactivated (disconnected on the AC side) or in "Stopp" mode.
Inst.-Code	Parameters for grid monitoring can only be changed after entering the SMA grid guard password.
KI-Wind-Reg	Control factors in Turbine mode. Further information on this topic can be found in the Windy Boy instruction manuals.
KP-Wind-Reg	
LDVtgC	Compensation for the voltage drop in the cabling. With this parameter, the voltage drop between the inverter and the grid connection point is taken into account. The 10-minute average voltage at the inverter connection must not exceed the sum of ACVtgRPro plus LDVtgC. The parameter LDVtgC is preset to 0 V for Germany. In grid areas in which the additional voltage rise protection (see parameter ACVtgRPro) is not required, the parameter LDVtgC is preset to 50 V. Thus, the voltage rise protection is deactivated for these grid areas (253 V + 50 V = 303 V) and only the fast cut-off via the Uac-Max parameter intervenes.
Plimit	Upper limit for AC output power.
Pmax	Output limitation of the inverter.
P-Wind-Mid	Parameters for adjusting the inverter in Turbine mode. Further information on this topic can be found in the Windy Boy instruction manuals.
P-Wind-Ramp	

Name	Explanation
Ripple-Ctl-Frq	The Ripple-Ctl-Frq, Ripple-Ctl-Lev, Ripple-Ctl-Rcvr parameters are intended to handle ripple control signals from the Sunny Mini Centrals. These parameters are not available for all Sunny Mini Centrals. These parameters may only be changed after prior agreement with SMA Technologie AG.
Ripple-Ctl-Lev	
Ripple-Ctl-Rcvr	
SMA-SN	Serial number of the Sunny Mini Central.
Software-BFR	Firmware version of the operation control unit (BFR).
Software-SRR	Firmware version of the current control unit (SRR).
Speicherfkt.	• *Default Parameter*: returns all parameters to the factory settings. • *Reset Betriebsdaten*: returns all user level parameters to the factory settings. • *Reset Fehler*: resets a permanent error.
Speicher/ Storage	• *Permanent*: modified parameters are stored in the EEPROM and can be used even when the Sunny Mini Central has been restarted. • *Volatil*: prevents the parameters being stored in the EEPROM, the parameters are only stored until the next restart.
T-Max-Fan	Temperature for the maximum fan speed.
T-Start	The period the Sunny Mini Central waits after the Upv-Start value has been reached.
T-Start-Fan	The fan starts to run at minimum speed at this temperature.
T-Stop	The period the Sunny Mini Central waits before disconnecting from the grid when Upv drops below the grid peak voltage.
T-Stop-Fan	If after a temperature increase the inverter cools down to below this threshold value, the fan switches itself off again.
Uac-Max	Lower (Uac-Min) and upper (Uac-Max) limits of the allowable AC voltage (stand-alone grid recognition), before the grid monitoring system disconnects the device from the grid.
Uac-Min	
Uac-Tavg	Averaging time for measuring grid frequency.
Udc-WindMax	Parameters for adjusting the inverter in Turbine mode. Further information on this topic can be found in the Windy Boy instruction manuals.
Udc-WindMid	
Udc-WindStart	
Upv-Start	The DC voltage required before the Sunny Mini Central begins feeding power into the grid.

Name	Explanation
Usoll-Konst	PV desired voltage for constant operational voltage. These parameters are only important when the "Betriebsart" parameter is set to U-konst.

14.4.2 Parameter Settings for Germany

Grayed out parameters are only displayed in installer mode. The table below contains the parameters that are applicable in Germany.

Name	Short descr.	Value range	Default setting	
			SMC 5000A	SMC 6000A
ACVtgRPro	V	230 ... 300	253	253
AntiIsland-Ampl *	grd	0 ... 10	0	0
AntiIsland-Freq *	mHz	0.1 ... 2000	500	500
Betriebsart		MPP, Ikonst, Stop, Turbine Mode, U-konst, Off_grid	MPP	MPP
Control		Auto, Grid, Bridge	Auto	Auto
Default *		GER/VDE0126-1-1, GB/G83, AUS/AS4777, USA/UL1741, IT/DK5950, Off_Grid, SP/RD1663, Other, trimmed	GER/VDE0126-1-1	GER/VDE0126-1-1
dFac-MAX *	Hz/s	0.1 ... 4.0	4	4
dZac-MAX *	mOhm	0.35 ... 20000	685	670
E_Total	kWh	0 ... 200000	0	0
Fac-delta- *	Hz	0.1 ... 4.5	2.45	2.45
Fac-delta+ *	Hz	0.1 ... 4.5	0.19	0.19
Fac-Limit delta	Hz	0 ... 5	2	2
Fac-Start delta	Hz	0 ... 5	1	1
Fan test		0 ... 1	0	0
h_Total	h	0 ... 200000	0	0
Inst.-Code				
I-NiTest *	mA	0 ... 25000	16000	16000

Name	Short descr.	Value range	Default setting	
			SMC 5000A	SMC 6000A
LDVtgC	V	0 ... 50	0	0
Pmax	W	0 ... 6050	5500	6000
P-Wind-Mid	W	0 ... 6000	2000	2000
P-Wind-Ramp	W/s	10 ... 2000	1000	1000
Ripple-Ctl-Frq	Hz	105 ... 1605	1605	1605
Ripple-Ctl-Lev	%	0.5 ... 8	8	8
Ripple-Ctl-Rcvr		disable, enable, auto	disable	disable
Riso-min	kOhm	0 ... 10000	1000	1000
Speicherfkt.			no function	no function
Storage / Speicher		permanent, volatile	permanent	permanent
T-Max-Fan	grdC	0 ... 110	90	90
T-Start *	s	5 ... 1600	10	10
T-Start-Fan	grdC	0 ... 110	70	70
T-Stop	s	1 ... 3600	2	2
T-Stop-Fan	grdC	0 ... 110	50	50
Uac-Max *	V	230 ... 300	260	260
Uac-Min *	V	160 ... 230	198	198
Udc-WindMax	V	1 ... 600	450	540
Udc-WindMid	V	1 ... 600	315	450
Udc-WindStart	V	1 ... 600	200	250
Upv-Start	V	250 ... 600	300	300
Usoll-Konst	V	250 ... 600	600	600

*Parameters designated with * are safety-related grid monitoring parameters. To change the SMA grid guard parameters, you must enter your personal SMA grid guard password (Inst.-Code). Call the SMA Serviceline to obtain your personal SMA grid guard password.*

14.4.3 Country-specific Parameter Settings

You can see the default settings of the Sunny Mini Central on the name plate (see section 4.1 "Identification" (Page 12)).

Sunny Mini Central SMC 5000A

The parameters listed below represent country-specific settings and are only displayed in installer mode. All other parameters are international and can be viewed in the table in section 14.4.2.

Name	Short descr.	Country settings				
		Germany	Australia	Great Britain	Italy	Spain
ACVtgRPro	V	253	253	253	253	253
Default		GER/ VDE0126-1-1	AUS/ AS4777	GB/ G83	IT/ DK5950	SP/ RD1663
dFac-Max	Hz/s	4	0,25	0.2	0.20	2
dZac-Max	mOhm	685	20000	350	350	350
Fac-delta-	Hz	2,45	0,19	0.5	0.29	0.98
Fac-delta+	Hz	0,19	0,19	0.5	0.29	0.98
I-Ni-Test	mA	16000	8000	0	0	0
LDVtgC	V	0	50	50	50	50
T-Start	s	10	45	180	10	10
Uac-Min	V	198	205	209	198	199
Uac-Max	V	260	265	261	262	250

Sunny Mini Central SMC 6000A

The parameters listed below represent country-specific settings and are only displayed in installer mode. All other parameters are international and can be viewed in the table in section 14.4.2.

Name	Short descr.	Country settings				
		Germany	Australia	Great Britain	Italy	Spain
ACVtgRPro	V	253	253	253	253	253
Default		GER/ VDE0126-1-1	AUS/ AS4777	GB/ G83	IT/ DK5950	SP/ RD1663
dFac-Max	Hz/s	4	0.25	0.2	0.20	2
dZac-Max	mOhm	670	20000	350	350	350
Fac-delta-	Hz	2,45	0,19	0.5	0.29	0.98
Fac-delta+	Hz	0,19	0,19	0.5	0.29	0.98
I-Ni-Test	mA	16000	8000	0	0	0
LDVtgC	V	0	50	0	50	50
T-Start	s	10	45	180	10	10
Uac-Min	V	198	205	209	198	199
Uac-Max	V	260	265	261	262	250

14.4.4 Fixed Parameters

Grayed out parameters are only displayed in installer mode. The following parameters are displayed in the parameter list but cannot be changed:

Name	Short descr.	Default setting	
		SMC 5000A	SMC 6000A
Fac-Pderating			
Fac-Tavg	ms	160	160
Hardware-BFS			
Plimit	W	5500	6000
SMA-SN			
Software-BFR			
Software-SRR			
Uac-Tavg	ms	80	80

15 Contact

If you have any questions or technical problems concerning the Sunny Mini Central, contact our hotline. Please have the following information available when you contact SMA:

- Inverter type
- Serial number of the Sunny Mini Central.
- Type and number of modules connected
- Communication method
- Blink code or display of the Sunny Mini Central

Address:

SMA Technologie AG
Hannoversche Strasse 1 - 5
34266 Niestetal
Germany

Tel.:+49 (561) 95 22 - 499
Fax:+49 (561) 95 22 - 4699
seviceline@SMA.de
www.SMA.de

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- Ignoring safety warnings and instructions contained in all documents relevant to the product
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- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
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